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USSR Report

CONSTRUCTION AND EQUIPMENT

No. 77

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COORDINATION OF ALL BUILDING PLANS, OPERATIONS URGED

Moscow EKONOMICHESKAYA GAZETA in Russian No 40, Oct 82 p 19

[Article by V. Korobko, candidate of technical sciences, director of the Khabarovskgrazhdanproyekt [Khabarovsk Planning Institute for Civil Construction] entitled: "When Agreement is Lacking"]

[Text] In March 1981 the CPSU Central Committee and the USSR Council of Ministers adopted the decree "On Measures for the Further Improvement of Planning and Estimate Work". It directed us toward the perfection of planning decisions for the purpose of lowering the cost of construction and the improvement of the conditions of the use of buildings and installations. The Khabarovsk Planning Institute for Civil Construction now takes the demands contained in this document as the point of departure in its daily work.

One of our tasks is, in the process of planning, to improve the heat shield of buildings and to secure the operational economy of fuel and energy resources. Taking the urgency of this question into account, especially in the regions of Siberia and the Far East, the USSR State Committee for Construction Affairs already in 1980 made its recommendations for increasing the heat efficiency of buildings, which, as the planners know, is attained thanks to the use of cellular brick, the reduction of the volume weight of expanded clay lightweight concrete, the construction of warm attics, triple glazing, the arrangement of double lobbies, the careful closing up of joints, and other measures.

The question arises: How to realize useful recommendations in practice? Here everything depends on the agreement, the synchronization of the operations of three partners: The planning institutes, the construction organizations, and the enterprises for construction materials. However, such mutual relations are absent in the Khabarovsk Kray. Only one plant turns out cellular brick (by the way, with deviations from the standard) in a quantity of 30,000 units per year. The demand of the builders of civil buildings for such wall material is met only to the extent of 5-8 percent. And, as they say, one cannot see a gleam of hope in the near future unless energetic measures are taken.

What ways remain at the disposal of the planners to improve the thermal response of cellular brick buildings? Only one--the increase of the thickness of the walls by virtue of laying an additional row of brick or thickening the vertical joints.

The first is recommended by the USSR State Committee for Construction Affairs (materials-intensive), the second does not solve the problem in regions with an estimated temperature of 32 degrees below zero (this temperature is regulated by building norms in all cities of our kray).

Thus the production of cellular brick must be developed in every possible way, which is something the RSFSR Ministry of the Construction Materials Industry must take care of.

Let us turn to the projects of houses being assembled from expanded-clay lightweight concrete panels and blocks in the kray center. We are forced to examine heating systems taking into account increased heat losses through the enclosing structure. The industrial enterprises of the Glavdal'stroy [Main Administration for the Construction of Industrial Establishments in the Regions of the Far East] practically are doing no work in regard to the reduction of the volume weight of expanded-clay lightweight concrete panels. For this reason, evidently, the present situation demands another approach to the solution of the problem that has developed--the organization of the manufacture of triple-layered wall panels with flexible bonds.

Not a single construction organization in the kray is doing work on triple glazing although Glavdal'stroy has to carry out this measure beginning with the current year.

We know that the TsNIIEPzhilishcha [Central Scientific Research and Planning Institute of Standard and Experimental Living], in accordance with an instruction of the USSR State Committee for Construction Affairs, should have corrected the model plans of houses for the purpose of increasing the thermal efficiency of buildings. However, if we mean the Khabarovsk Kray, not a single model plan was revised. What is more, the Central Scientific Research and Planning Institute of Standard and Experimental Living refused to carry out this "operation" with respect to the houses of the series 111-121.

Thus, the problems of increasing the thermal efficiency of new buildings in the Khabarovsk Kray remain unsolved for the time being, regardless from what side you approach them.

No less important from the economic standpoint is the transition of enterprises producing reinforced concrete products to the output of new efficient designs. The planning organizations, including our institute as well, received an instruction from the USSR State Committee for Construction Affairs not to use obsolete designs in planning. But what is the outcome in practice? The institute follows the instruction, but the construction organizations object, and the plans do not agree. As a result, the planning estimates turn out to be unconfirmed within the designated periods. But the further turn of events is as follows: Under the influence of various "circumstances" the institute is compelled to correct the planning estimates and to specify the use of former (that is uneconomical) designs. As a result, there is an increase in the price of both planning and construction and installation work. Moreover, in many cases the increase in prices is included in the estimated cost.

Such a state of affairs, in our view, developed in many respects because of the insufficient exactingness toward the construction organizations on the part of the architectural organs at the local level and the poor control exercised by them over the fulfillment of the recommendations of the USSR State Committee for Construction Affairs.

I will cite the following example as well. Four years ago, the Main Administration for the Construction of Industrial Establishments in the Regions of the Far East turned to the institute with a proposal for planning pile foundations with a high foundation mat for nine-story houses of the series 111-125. The institute responded and within a short time corrected the planning estimates for some houses. Further, by mutual agreement, we began to plan such foundations where the geological conditions allow it.

The experiment succeeded. In every foundation under one block section the savings amounted to 2,500 rubles. It would seem that the further introduction of the progressive method on a wider scale would follow.

But this did not happen. The construction organizations lost interest in their innovation and gradually reduced the installation of pile foundations.

Thus, the struggle for lowering the cost of housing and civil construction and the increase in the degree of saving of buildings requires the mutual interest of planning and construction organizations. But such interest, unfortunately, for the time being is not sufficient.

8970
CSO: 1821/14

CONSTRUCTION PLANNING AND ECONOMICS

LARGE METALLURGICAL PLANT AT KOMSOMOLSK-NA-AMUR BEING BUILT SLOWLY

Moscow STROITEL'NAYA GAZETA in Russian 12 Mar 82 p 1

[Article by V. Tel'nov, nonstaff inspector of the city People's Control Committee; V. Kondratov, chairman of the lead group of NK [People's Control] of Komsomol'sk-metallurgstroy; and O. Kvyatkovskiy (Komsomolsk-na-Amur): "Time Is Being Burned Away During the Freeze"]

> [Text] Last year, at its main construction site, Komsomol'sk-metallurgstroy [Trust for the Construction of Metallurgical Enterprises in Komsomolsk-na-Amur] failed to meet the plan by a million rubles' worth of construction and installing work. And not for the last time, because people were not completely utilized. For nowadays the trust is to provide for a work volume that exceeds last year's 4-fold. And in a year it is to surpass that figure 4-fold.
>
> Time has special value at such a construction project.

It is a USSR Minchermet [Ministry of Ferrous Metallurgy] reduction plant with a capacity of 500,000 tons of light rolled section per year. A new and important construction project that is large and unusual even for Komsomolsk. Foundation-laying day was 24 July 1981. Time for startup is the 11th Five-Year Plan. Komsomol'skmetallurgstroy Trust was created to erect the enterprise. The difficulty of the task that faces its collective will become clearer if the scale of the job is related in the briefest of words.

More than 200 million rubles' worth of construction and installing work is to be done on the first-phase complex alone. The total amount of capital investment today, at the concluding stage of preliminary-design approval, comes close to 700 million.

USSR Gosstroy has confirmed this construction project as a model demonstration project for Minvostokstroy [Ministry of Construction in the Far East and Transbaykal Regions]. This means that from the very first steps, it should have proceeded competently, with precision and in modern fashion. And the construction deadlines are short. The price of each work-day is that much higher.

More than one stadium would be needed to accommodate the foundation pit for the electric steel-melting department. The cold is ferocious, and the locker room seems like a paradise. And a bonfire fumes richly in the foundation pit, breaking

through the biting mist. Vasiliy Petrov's whole brigade has been gathered here. And the brigade leader already is famous in the construction project's short biography. Not so much for the fact that his signature was on the report of the laying of the plant's foundation as for the fact that the "Petrov axis"--the footings along the department's end lines--were set up much more rapidly than its neighbors were.

The plan for February is 600 m^3 of concrete," says the brigade leader. The job is in and of itself realistic. Were it not for the concrete....Now think, why do we not go warm ourselves in the lockerroom until there are vehicles? We keep watch so that others will not intercept the concrete. It's all the same to the drivers."

"Concrete!" This word sounds nowadays at all the metallurgical plant's facilities. And not just Petrov's brigade loses valuable worktime waiting for it.

Foreman Anatoliy Ivankin's section received only one vehicle load during a shift. Three brigades lost practically a full work day: it was planned to lay 58 cubic meters but 11 were laid.

"The continuous concreting process has been disrupted," says SU-6 [Construction Administration No 6] superintendent Vitaliy Morozov. "A model attitude toward the construction project is not visible: 60 people for one crane, and the more the people, the more they interfere with each other."

Two of the facilities due for early startup this year are in superintendent Boris Kiyevskiy's section. The first facilities due for early startup at this project were a dining hall to seat 300 and an administration and domestic-services building. The plan for January was not met, although two shifts were worked.

"Khabarovsk's Zhelezobeton-1 [Reinforced-Concrete Trust No 1] sends columns that are much longer than they are supposed to be," says the superintendent. "Much time goes into adjusting the formwork. But the main time is lost because of the concrete. The ZhBI's [reinforced-concrete products plants] in Komsomolsk not only send us concrete last but they violate its parameters, mainly the water-cement ratio. However you heat it, it's still water, and the footings will crack and it will have to be done over."

Superintendent B. Kiyevskiy has many people, but on the whole site there is a single welding apparatus. There are no theodolites. Ordinary tape measures are in short supply. The bulldozers are idle for the second month: there is no winter oil. There is no cable for electrical heating of the concrete.

The empty minutes, hours and shifts flow by in an avalanche....In 9 months of the trust's existence, 1,200 man-days were lost. It happens that each construction worker was absent 3 days. Isn't that quite a few for the beginning? And is it only because of the perversity of the suppliers, who had obstinately "not noticed" that the new trust and its enormous facility were incurring such losses?

The workers said with annoyance: special bus trips to work places could be set up with the help of Glavdal'stroy [Main Administration for Construction in the Far East]. However, the administration supervisors preferred to use the buses for personal transport. And still another hour passes from the morning to no purpose: people still get to the future plant from distant parts of the city.

Until recently it was difficult to eat at the construction project. Right now there is no question. There is a special domestic-amenities superintendence. Three field hot-water centers have been established--dinner takes only 10 minutes. It is trusted that eventually the new superintendency will act just as responsively and efficiently. But there still are not enough lockerrooms, and services centers still have not been developed.

11409
CSO: 1821/175

GLAVZAPSTROY'S SUCCESSES IN INDUSTRIAL CONSTRUCTION IN LENINGRAD EXPLAINED

Moscow NA STROYKAKH ROSSII in Russian No 3, Mar 82 (signed to press 22 Feb 82) pp 2-7

[Article by K. Glukhovskoy, chief of the Order of Lenin Glavzapstroy [Main Administration for Construction in the Western Economic Region] of USSR Minstroy [Ministry of Construction] and Hero of Socialist Labor: "An Effective Way to Use Capital Investment"]

[Text] The November 1981 CPSU Central Committee Plenum gave builders an important task--to increase the introduction of fixed capital into operation, with reduced growth in capital investment. This requires that the industry's workers mobilize all efforts and resources and use widely the valuable experience of advanced organizations.

In his speech, L. I. Brezhnev named Glavzapstroy of the USSR Ministry of Construction, which from five-year plan to five-year plan has introduced planned jobs on time or ahead of time, as among the best collectives that are achieving successes in their activity.

In 1978 Glavzapstroy converted to planning and evaluating its activity in accordance with construction commodity output--the first regional construction organization in the country to do so--which helped in the introduction of a number of organizational and technical measures aimed at achieving the final result--the introduction into operation of production capacity and facilities on time or ahead of time. The main administration's collective was awarded the Order of Lenin.

Glavzapstroy's experience is especially valuable because the bulk of its industrial construction program has been the reconstruction and expansion of existing enterprises, and this enables capital investment to be used more effectively and production capacity to be increased and assimilated more rapidly and less expensively than is the case with new construction.

The basis of the collective's success is the maximum concentration of labor, material and financing resources on projects due

for early startup, a well-thought out system of preparing for construction operations, close contact with designers and clients, broad socialist competition under the Workers' Relay principle, modern methods for managing construction and for organizing and performing the work, and other progressive solutions that enable the engineering level of construction to be raised, and, on that basis, turnover of the jobs to be accelerated. Oblast and city party organs extend much help and support to the main administration.

During the 11th Five-Year Plan the main administration has adopted a firm policy toward completing facilities that have been started and reducing newly started projects. These steps will make the plan more realistic and balanced and will reduce uncompleted construction volume.

Below is published a selection of information about Glavzapstroy's work experience. Glavzapstroy's chief, Hero of Socialist Labor K. Glukhovskiy, tells in his article about the methods and principles for rhythmicity in the erection and turnover of facilities due for startup during the year, primarily at enterprises that are being rebuilt or expanded, and the other articles [not included in this translation] tell about the discovery of large reserves for improving design and budget-estimating documentation quality, the development and realization of organizational, technical and plan documentation, the peculiarities of outfitting work, the installation of monolithic structure, the mechanization of work during reconstruction, and experience in the turnover of a large production complex.

Glavzapstroy, with an annual work volume of about 500 million rubles, is the country's largest construction organization. More than half of all the contract work is industrial construction. The share of reconstruction here rose from 56.6 percent in 1975 to 80 percent at present, greatly exceeding the indicators for the country as a whole. And this is natural for Leningrad, where many enterprises were created tens and even hundreds of years ago and right now need radical rebuilding.

Well-known plants (now associations)--the Kirov Plant, the Optico-Mechanical Plant imeni V. I. Lenin, the Leningrad Metals Plant, the Izhorskiy Plant, Elektrosila, Admiralteyskoye, Pozitron, Krasnyy Vyborzhets, the Baltiyskiy Plant, and many others--have been reborn.

Production facilities are being modernized on a new engineering basis in two main directions:

by way of the partial rebuilding of individual departments and production buildings, with updating of the industrial equipment; and the successive reconstruction of various groups of production facilities and the creation of updated modern enterprises on the sites of obsolete departments or on lands that have been released.

In Leningrad, preference is given to the second trend, since it creates more favorable conditions for the wide introduction of integrated mechanization and advanced work technology, providing for a high level of labor productivity and output quality.

The Kirov Plant Association, where integrated reconstruction, which embraces all production facilities, is being accomplished consecutively, is an example. In this case the utility and service structures and lines are being completely rebuilt. One large modern department is being erected on the site of several old low and dark departments. The main tractor, wielding, rolling, tractor-shipping and other departments of the association have been enlarged this way.

The rolling department was rebuilt on the grounds of obsolete iron and steel rolling departments. The interlocking of existing buildings and of buildings being rebuilt enabled more than 1 million rubles to be saved. Labor expenditures were reduced by 16,200 man-days in comparison with the designed expenditures.

Many buildings were turned over for operation much earlier than the planned deadlines. This result is not by chance. Major organizing work by supervisors of the enterprises and of Trust No 47 and the creation of association party groups and of an association staff for the construction projects proved to be decisive influences on construction progress.

As a result of reconstruction at the plant, new automatic lines for machining parts and components and conveyor assembly lines have been installed. Product output has been increased 2-fold, labor productivity 1.8-fold.

Substantial resources and time were also saved with the integrated rebuilding of obsolete Leningrad enterprises--the Krasnyy Vyborzhets and Izhorskiy Plant PO's [production associations] and many other enterprises.

It is the fourth year now that Glavzapstroy has been working under the new management terms, wherein settlements are made for finished commodity output. This has compelled the main administration's subunits and services to look more thoroughly into all questions linked with introducing jobs into operation.

The prerequisites for successful construction are being incorporated in advance. The main administration's services are maintaining contacts with design organizations back at the predesign stage and during development of the documentation. In addition to the refinement of current questions, this enables new and progressive designs and materials and methods for organizing construction to be considered additionally in the designs, and it enables the contractor to begin preparation for erecting the facility prior to obtaining the design and budget-estimating documentation.

The simultaneity of the development of the design and budget-estimating papers (by the design institutes) and of organizational and technical documentation (by the contractors' services) for a number of large and technically complicated complexes of the Izhorskiy Plant and Leningrad Metals Plant PO's, for the main building of the branch plant of the PTO [Production Equipment Association] imeni Kirov in Lodeynoye Pole, for livestock complexes for 10,000 head of cattle in the Pashskiy and Volna sovkhozes, and so on, is a graphic example.

When organizing the construction of facilities, a maximum possible concentration of material, equipment and labor resources at the complexes that are due for early startup is called for, as are intensification and the maximum possible combining of various construction, installing and special operations in time.

All these questions are being resolved in the PPR's [work plans] that are developed for most of the facilities being built and for the most complicated facilities by the services of the Orgtekhstroy [State Trust for Industrialized Construction]. The operating solutions of the PPR's are closely tied in with the computations for the requirements for material, equipment and labor resources, based upon unified technological standards documentation (UNTD).

Design solutions for organizing construction and doing the work are optimized in large part with mathematical-economics methods and computers. Achievement of the established deadlines and other technical and economic indicators for construction are the criterion of optimality.

Simultaneity in the designers' and contractors' carrying out developments enables, aside from the possible mutual influences on decisions, the period for direct preparation for construction to be reduced. Glavzapstroy already has extremely positive experience in combining design with the start of work and in transferring facilities and areas to clients for operation and for industrial assimilation while the complexes are being erected.

All this, in the final analysis, leads to solution of the main task--the assimilation of capital investment by year and the introduction on time, and in many cases ahead of time, of complexes and facilities that are due for early startup.

Glavzapstroy was one of the first to come out as the initiator of turning over facilities, primarily the most important production capacity, for operation ahead of time. It is well known that in construction practice the overwhelming majority of industrial facilities are introduced in the fourth quarter and, most often of all, in December. The clients plan it that way because of late deliveries of equipment, thus also reinsuring themselves against responsibility.

Meanwhile, advancing the turnover of facilities to earlier dates permits the construction and installing organizations' workloads to be arranged more rhythmically, work quality to be raised, and, what is very important, the assimilation of new production capacity to be started ahead of schedule and the country to be saved, in this way, hundreds of millions of rubles' worth of added industrial and agricultural output: it is also our duty, as builders, to strive not just for the interests of our agency but also for those of the state.

Trust No 32, which in 1977 decided to turn over 8 out of 11 facilities in the listings of the national economic plan and of USSR Gosplan in the second and third quarters, was the first example of this. This initiative found wide support in other trusts--Nos 39, 36, 49 and 46, and then in the rest, which also began to transfer to the rails of rhythmic operation.

During the 10th Five-Year Plan, 90 out of 365 facilities and items of production capacity of the national economic plan and of USSR Gosplan were turned over ahead of the plan and of standard deadlines by 2 to 8 months. By introducing jobs and fulfilling the plans for construction commodity output ahead of time, the main administration each year has reduced the amount of uncompleted construction work by 20-40 million rubles.

Such achievements could not have come suddenly. Bit by bit, the collaboration of interdependent activities took shape, and this was the cornerstone of the rhythmic

turnover of facilities during the year. The builders got capacity started up and assimilated ahead of time only through joint work with client enterprises and designing and outfitting organizations.

How does this appear in practice? Construction and installing trusts, together with clients and supply organs, examine, during the stage of engineering preparation for operations, the most important projects that are due for early startup, and they identify those projects for which the client can provide equipment and those at which contractors and subcontractors can carry out their work volumes by earlier deadlines.

After this an agreement for creative collaboration is concluded, with concrete commitments for each construction participant and with the involvement of social organizations, and coordinating councils are created in accordance with the example of the Sayano-Shushenskaya GES's builders--this organ showed itself to be an efficient organizer of integrated competition for the final result. The earlier deadline becomes a directed deadline, it is confirmed by decision of the main administration's board, and responsibility for an interruption of it is borne as it would be for a planned deadline.

Most of the facilities on the listings of the national economic plan and of USSR Gosplan are now being rebuilt on the basis of agreements for creative collaboration. The first such agreement was concluded in January 1979 for facilities to be rebuilt at the Plant imeni Lepse. The general contractor--the Order of Lenin Leningrad PSMO [Industrial Construction and Installing Association] (formerly Trust No 36), the client and 20 subcontracting organizations made up a schedule for joint operations for the turnover of steel-casting capacity 2 months ahead of the deadline, by 7 November. Precise fulfillment of tasks by each participant, comradely attitudes, and a feeling of responsibility for one's partner served as the basis for the successful fulfillment of commitments.

Glavzapstroy also took into its armament the experience of the builders' collective at the Nurekskaya GES, where the Workers' Relay was born--a new form of socialist competition for interdependent activities. The main administration's collective strives to make the Workers' Relay the style of its own production activity. Competition at the construction sites of the Nevskiy Plant and Elektrosila Associations, is going on under the slogan, "From mutual complaints to mutual assistance."

The main administration's builders constantly perceive in their work the concrete help and support of the CPSU's Leningrad Oblast and City Committees and party committees of Leningrad City and Leningrad Oblast rayons. They not only monitor the builders' work but in case of necessity help to arrange contacts with the designers and clients in order to bring closer the dates of equipment deliveries.

At the Izhorskiy Plant PO, thanks to the introduction ahead of time of some capacity for power machinebuilding production, output rose by 20 percent. A typical example is the Fosforit Association. In the last 10 years all the facilities here have been turned over for operation on time or ahead of time. As a result, production volume has more than doubled.

The second phase of the Pashskiy complex for fattening 10,000 head of cattle was put into operation a year ahead of time. This means that Leningraders receive more than 5,000 tons of beef above the plan on their tables.

The introduction of capacity ahead of schedule at the Krasnyy Vyborzhets Association has enabled a large amount of rolled nonferrous metals to be produced above the plan and the output of 83 new items of economical rolled section to be mastered. Out of 49 facilities for light industry and the food branch of industry, 23 were introduced ahead of time.

Such examples can be cited for many Leningrad enterprises, including such gigantic renovated domestic industries as Elektrosila and the Metals Plant.

Trust No 32 achieved major successes during the 10th Five-Year Plan. For all five years it was awarded the challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee, twice with inscription on the All-Union Honor Plaque at the Exhibition of Achievements of the USSR's National Economy. The trust's collective has put into operation 102 facilities called for by the plan, including 48 of them ahead of time, of which there were 20 types.

The successes of the collectives of the Order of Labor Red Banner Trust No 35 and Trust No 39 were also highly evaluated. In 1980 they also were awarded challenge Red Banners, with inscription on the All-Union Honor Plaque.

It must be said that the builders' successes were possible thanks to the development of an operating base. In no way will the highest quality of design and the closest collaboration of all construction participants bring the desired results if they are not reinforced by measures for engineering progress on the largest scale.

Glavzapstroy became a pioneer in the use of many progressive items of constructional structure and of effective operating solutions. Thus, prefabricated reinforced-concrete three-dimensional enclosures, vibrated brick-wall panels and partitions, prefabricated monolithic footings for heavy industrial equipment, progressive structure for building fully prefabricated agricultural-production facilities, integrated roof slab fully readied at the factory, prefabricated partitions of various types, and bitumen-perlite insulation found wide distribution.

Conveyor-module and jig-free methods for erecting roofs, the laying of footings by the ramming method and of concrete floors by the vibration-vacuum method, a whole complex of modular off-the-shelf formwork, mechanization of the laying of concrete mix by means of high-capacity concrete-pump trucks, sets of norms for the performance of various operations, and nondestructive methods for monitoring concrete and reinforced concrete are being used widely.

Partitions with metal framework, faced with dry gypsum plaster sheet of improved quality, are being introduced successfully. They will enable manual-labor expenditure to be reduced 1.5-fold, the weight of the partitions 4-fold. For this purpose, a rolling mill for manufacturing thin metal plate for shaped formwork has been fabricated with the help of Leningrad plants and is in operation.

The improvement of labor processes and the development of more progressive forms of socialist competition, which actively affect labor-productivity growth, are playing a substantial role. Thus, the main administration has more than 1,000 contracting brigades that do more than half of all the SMR [construction and installing work] volume. The Sverdlovskers' initiative, "Accomplish the brigade's

five-year tasks with fewer people," has been widely disseminated. Worker collectives numbering 665 have released more than 700 workers, from which 50 new brigades that are doing 4 million rubles' worth of work have been created.

Great importance is attached to raising workers' skills. Each year more than 8,000 workers of various specialties are being trained in construction schools for advanced methods. Thanks to this, labor expenditures each year are being reduced by about 80,000 man-days. An especially great benefit is obtained where sets of norms are being introduced. In combination with optimal worker manning of the brigade and rational technology for doing the work, this permits output per worker to be raised by 10-12 percent. During the 10th Five-Year Plan more than 1,000 brigades were supplied with sets of norms.

The USSR Supreme Soviet Presidium awarded Glavzapstroy the Order of Lenin for successful fulfillment of 10th Five-Year Plan tasks and socialist commitments for building and introducing production, housing, cultural and domestic-amenity facilities and for increasing production and improving the quality of output. This high award greatly obligates our multithousand-man collective.

The builders' tasks for the 11th Five-Year Plan were determined by 26th CPSU Congress decisions, which pay special attention to the need for the timely introduction into operation of fixed capital, the concentration of funds and resources at the most important construction projects, and a reduction of uncompleted construction work.

In developing the draft of the five-year plan, growth in construction commodity output was to surpass the amounts of construction and installing work by 35 percent. The number of projects at the end of the five-year plan was reduced by 26 percent, and work volume per construction project is growing by 58 percent. As a result, the surplus of the budget-estimated ceiling for carryover facilities was reduced by 41 percent (taking newly started jobs into account) and the amount of uncompleted construction work is 71 percent of the annual program for 1985 instead of the 90.8 percent on 1 January 1981.

It should be noted that, while chemical construction projects predominated during the last five-year plan, right now special importance is being attributed to jobs for the RSFSR Nonchernozem Zone.

As has already been said, the rebuilding of enterprises comprises Glavzapstroy's basic work volume for industrial construction in Leningrad. By rebuilding, we can greatly increase capital investment effectiveness and greatly increase industrial capacity. In order to realize these advantages, it is desirable in many cases to restrict the release of client-ministry funds to new construction.

11409
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IRRESPONSIBILITY SLOWS CONSTRUCTION OF NEFTECHALA IODOBROMITE PLANT

Baku VYSHKA in Russian 10 Apr 82 p 2

[Article by S. Gopanyuk (Neftechala): "Interruption"]

[Text] For the new Neftechala Iodobromite Plant to come up to design capacity next year, participants in its construction should do 2 million rubles' worth of work by 20 December.

There is a schedule, but neither the general-contracting SU-26 [Construction Administration No 26] of Minpromstroy [Ministry of Industrial Construction] nor the Glavuprazmontazhspetsstroy [Main Administration for Installing and Special Construction Work in Azerbaijan] subunit, nor the plant's board is adhering to it. As a result, there was an interruption and the plan for the first quarter fell through. Instead of 500,000 rubles' worth of work, 180,000 rubles' worth was carried out. SU-26 chief G. Aliyev and plant director A. Akhmedov blame the subcontracting organizations, which carried out their task for the quarters by 35 percent, for all their troubles.

In order to look into it we had to visit the facilities where work on the schedule had been broken off. These were the machinery-repair department (RMTs), production buildings Nos 1 and 4, the scrubbing structures and other facilities.

Two hundred luminaires and a multitude of electrical devices had not been installed in the RMTs. The section under the supertendency of M. Ismaylov of BMU-1 [Local Control Administration No 1] was supposed to do this. The general contractor and the board blamed him for the fact that he did not do 3,000 rubles' worth of installing work in the indicated department.

I converse with Ismaylov and he explains that the director did not give the installers the luminaires, which were available at the warehouse. The director defended his decision, saying that there were no windows or doors in the department. After installation of the luminaires and other things, the apparatus might be "liberated."

The conclusion from this situation was clear: work at the RMTs was interrupted through no fault of the electrical installers. The general contractor had not provided for this department's full construction readiness by the deadline, for he had not installed windows and doors as prescribed by the schedule. Nor can one approve of the plant director's position. Failure to supply the equipment for installation because of fear that it would be pilfered is no solution. There are

36 workers on the board's staff. Protection of these premises, which still cannot be locked up, could have been arranged. The general contractor also bears a share of the responsibility for protecting property at the facility. But the partners did not solve this problem. For this reason, the installing work was interrupted not only at the RMTs but also at three buildings.

At the same time, the complaint of the plant supervisors against Soyuzyodobrom [not further identified] Association because of the lack of 40 specialists called for by the staffing document was correct.

In building No 1, workers of the Sumgait Installing Administration of Azneftekhimmontazh [Azerbaijan Trust for the Installation of Chemical Industry Equipment] could not install three large pumps. The reason? A disagreement between the installation and the construction drawings about a portion of the pump footings had appeared. So-called connecting frames had to be prepared for the footings. But what concretely has to be done? A specialist supplied by the client has to resolve this. But there is no specialist, and the job was stopped.

There is a still more difficult situation at the ion-exchange equipment section. Equipment installation should have been completed in March. But here also the installer's business did not proceed. Apparently they had everything there: the equipment and the footings for it had been prepared according to the blueprints. But the plant that manufactured the apparatus had stated the prerequisite that the mechanisms should be installed not on one level but in accordance with the cascade principle. And here, because of the lack of a specialist, the problem was not resolved. This prevented the assimilation of 400,000 rubles of capital investment in the first quarter!

The facts are persuasive that the client and general contractor, SU-26, are preventing the installing organization from carrying out the plan and from operating on schedule.

There is special talk about Azsantekhmontazh [Azerbaijan Trust for the Installation of Sanitary Engineering Eqipment], which, despite the schedule, does not undertake the job. Its representative, Deputy Chief Engineer Ya. Yushuyev, had attended a technical conference about construction of the iodobromite plant. The report stated: "Accept Azsantekhmontazh's announcement that in March 21,000 rubles' worth of work will be done." Not a finger has been lifted. There is still not one sanitary engineer. And a work front has been waiting here for them since the start of the year. At the RMTs, building No 1 and five other facilities. It seems that a weighty cause has prevented the trust from carrying out the plan at this construction project. It was explained on arrival in Baku: the cause is, actually, serious--it is irresponsibility! Yushuyev was at the conference about the construction project on 5 March. And only on 31 March, while calling at a production section, he ordered engineer Tariverdiyev to send a letter of instruction to the Ali-Bayramli Installing Administration of his trust that presribed that work begin at the iodobromite plant.

Incidentally, this trust had been ordered to do work on industrial ventilation at the construction project named. But the work has been broken off completely.

Even the general contractor does not demonstrate an example of a responsible attitude toward the matter. It was indicated above that he did not insure readiness for construction of the RMTs. But this case is not a solitary one.

I became acquainted with N. Gezalov's reinforcement-workers' brigade in building No 4. The brigade was doing work not typical of it. Some of the people were gathering trash, and some were dragging earth for fill.

"What has this got to do with the reinforcement Job? Indeed, you are almost a month behind schedule."

"We have, as you see, a voluntary free Saturday's work that is compulsory," the brigade leader tried to joke.

Then the man broke. Gezalov said that the brigade works a third of the time at subsidiary operations. Earnings have fallen. Even SU-26 chief T. Aliyev calmly listened to this conversation, and he confirmed it all.

"The brigade leader speaks the truth. There is no work for the brigade. Neither is there reinforcement steel for buildings Nos 1a and No 4 or for the scrubbing installations. Out of the 150 tons of reinforcement steel proposed for the first quarter, the UPTK [Production Operations Outfitting Administration] of Trust No 2 gave us only 60 tons."

Aliyev also cited other cases of poor supplying of materials. He recalled that the facility required 190 tons of asphalt but they sent him 10 tons. This is testimony to the fact that for Trust No 2 of Minpromstroy [Ministry of Industrial Construction] the iodobromite plant still has not become an especially important construction project of the republic.

Neither is an acquaintanceship with Ivan Mindrin's brigade of installers encouraging. It carries out the shift's tasks 101-102 percent. But it proved earlier more than once that it can carry them out 130-140 percent. There are not enough lifting mechanisms to support the brigade. In all, two cranes are operating here. In the builders' opinion, twice as many are needed.

The SU-26 chief presented his ministry an engineering calculation of the load-lifting and installing operations: 2,700 cubic meters of prefabricated reinforced concrete, a lot of metal structure and other items must be installed. The calculation confirms that in order to carry out the plan, a minimum of 4 cranes, not 2, is needed. The lacking equipment is being awaited at the construction project, and they are sure that the situation will not improve without it. But here is what I would like to call attention to. The available builders' cranes are being used on one shift. But if they organized a second one, the execution of installing and load-lifting work with that same equipment could be almost doubled. An important reserve remains hidden under a bushel.

In studying the causes of the failure to meet the plan at the iodobromite plant, one comes involuntarily to the conclusion that its basis is irresponsibility toward the job by some supervisors, a dependent attitude, an absence of any initiative whatever, and others. Show the client and general contractor elementary motivation for the matter charged to them, and they could organize the more effective use of construction equipment and they could responsively solve the difficult questions that arise during installing work.

Even the construction project staff is not exhibiting an approach that is marked by initiative and the use of internal reserves. At the technical conference that was

held in March, a solution for 32 points was adopted. They were all of the same kind: who promises to carry out what amount of work. Questions of the interruption of tasks were not examined, and irresponsible workers were not exposed. There was not one word said about initiative, about the use of reserves, about introducing progressive work methods. Such an approach also predestines interruption.

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MEMBRANE ROOF ERECTED OVER OPERATING MACHINEBUILDING PLANT

Moscow PRAVDA in Russian 14 Apr 82 p 2

[Article by N. Petrov (Moscow): "Operation 'Roof'"]

> [Text] While Moscow's Kompressor Plant was being rebuilt, an important scientific and technical experiment was being completed. The other day a new roof appeared over an enormous factory department whose area is more than 5,000 square meters. And what a roof! There is no other one like it in the country.

The old roof, which rested on wooden trusses, had served a department of Moscow's Kompressor plant faithfully for 50 years. The life term for such a material as wood is not great, especially if one considers the continuous vibration and oily evaporation. No mending of any kind saved the patched and repatched roof from "dripping." And when it rained, some of the machine tools had to be protected with tarpaulins and roofing felt. Closing the department for repair even temporarily would mean stopping the Kompressor plant. And then specialists of the Scientific-Research Institute for Concrete and Reinforced Concrete (NIIZhB) of USSR Gosstroy, which proposed to recover the department with a completely new type of roof--light in weight and made of economical thin plate membrane, has been engaged in studying such structure for many years, came to help.

The principle in and of itself is not new. Sports palaces in Leningrad and on Prospekt Mira in Moscow have been covered with membranes. But there the membranes had been "tensioned" over buildings that were circular or nearly so while they were under construction. But this is an operating department. It is an enormous rectangle in which there are hundreds of machine tools and people work in two shifts. Moreover, the membrane had to be hung on the existing old walls, and this complicated the job. And is it possible to do it at all?

It is possible! answered NIIZhB specialists. Together with ProyektNIIspetskhimmash [Scientific-Research Institute for the Design of Special Chemical Machinebuilding], they solved a technical problem that the builders had not encountered before.

...I managed to visit the Kompressor plant at a time when the operations were only opening up. Large steel rolls several meters in diameter that had been sent from Kuybyshev were lined up along one of the department's walls. And on the other side of the building was a hoist, by means of which the rolls were opened up and the metallic strips were apparently straining toward the roof. The new roof was

installed several metershigher than the old one. For the time being it rested on a latticework made of specially erected steel scaffolding. Steel plates weighing 15 tons each lay in a row, next to each other, and the joints had been welded. This continued until they had been converted into a single gigantic sheet of 66x83 meters, which will cover the whole department.

Workers and specialists of Stal'konstruktsiya [Trust for the Erection of Steel Constructional Structure] carried out the unusual operation, and organization of the work was planned by Promstal'konstruktsiya [All-Union Scientific-Research and Design Institute for the Use of Steel Structure in Industrial Construction].

I confess that I was getting ready to write this report precisely in the middle of November, when the operations were in full swing. But the originator of the design and manager of Operation Roof, Doctor of Engineering Sciences and USSR State Prize Winner I. Lyudkovskiy, who was manager of the NIIZhB laboratory, asked me to wait until the completion. "What, are some kind of ChP's [extraordinary occurrences] possible?" "There shouldn't be any, all the engineering solutions have already been checked, on facilities of much more modest size, it is true. But still....For all that, this is the first time a rectangular roof so large in area will be erected, and, moreover, above an operating department."

Installers N. Martychenko and V. Luk'yanenko put the finishing touch to Operation Roof on 24 March. It was they who disassembled the temporary scaffolding that had been holding up the membrane. And one of the most experienced installers of Minmontazhspetsstroy [Ministry of Installation and Special Construction Work], Distinguished RSFSR Builder I. Dorozhkin, was in charge of the brigade. As for the compressormakers, they did not even know that a new roof had already been prepared above them. Work in the department was not interrupted.

The new roof looks like an enormous bowl, with rectangular edges. We walked about the department, constantly craning our necks upward--everyone wanted to take a look at it. But the old covering, which will now be gradually dismantled, prevents it. And then we went upstairs and took a walk around the bottom of the bowl, in the center of which is mounted a large spherical glass cupola--through which light will penetrate into the department. We didn't like to believe that a membrane only about 4 mm thick was holding us up. In order to protect it from corrosion, the membrane will later be covered with a thin layer of concrete.

"The economic benefit from using the new method to rebuild the department will, according to calculations, reach almost a million rubles," reported Kompressor plant director A. Petrov. "No one other method would enable us to do the work in such a short time, all without stopping production. We propose to rejuvenate other departments of the plant in the same way--for some of them are more than 100 years old."

"First of all I would like to note the technical boldness of the Kompressor supervisors, and also of Stal'konstruktsiya Trust under M. Kolesnik, who decided upon the complicated scientific and technical experiment." comments USSR Gosstroy Deputy Chairman I. Ishchenko. "Many specialists considered that membrane-type structure can be highly effective only on circular buildings, and there are not too many of them. It has now been proved that a membrane roof can be of practically any shape. This will expand the sphere of application of the convenient, highly effective lightweight structure. One can go farther: 'draw' a steel roof all at once

over several old premises and, in a short time, get a new department as a result. Gosstroy intends to take measures to disseminate the innovation widely in the practice of rebuilding existing enterprises and constructing new ones."

"In our industry there are many departments that await radical rebuilding, including roof replacement," said Deputy Minister of Chemical and Petroleum Machine Building M. Troitskiy. "Primarily, in such cases, new premises are usually built, to which equipment from the dilapidated bays is hauled, and only then are the old buildings renovated. Now, relying upon experience, we intend to examine many earlier solutions and we are counting on obtaining no small economic benefit and considerable winnings in time."

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DMITRIYEV COMMENTS ON ECONOMIZING CONSTRUCTION MATERIALS

Moscow EKONOMICHESKAYA GAZETA in Russian No 18, Apr 82 (signed to press 26 Apr 82) pp 11-14

[Article by I. N. Dmitriyev, chief, construction department, CPSU CC: "Economizing materials in construction"]

[Text] It is difficult to overestimate the value of economy and thrift in capital construction. The orbit of construction industry has attracted enormous material, fuel and energy and labor resources. Roughly 12 percent of all products of material production in terms of cost and 35 percent in terms of tonnage are consumed by this sector.

More than 126,000,000 tons of cement, 250,000,000 cubic meters of concrete and reinforced concrete, nearly a billion cubic meters of non-metallic materials, about 260,000,000 square meters of window glass, 40,000,000 tons of sheet metal, over 100,000,000 cubic meters of lumber and many other materials and parts are produced each year to meet the needs of construction in our country--worth a total of about 50,000,000,000 rubles. At such scales, every percent of savings in material resources in construction yields a profit of almost 500,000,000 rubles for the state. But there's another side to the coin: the percent of losses costs just as much. And they are still large.

In this context, it is appropriate to mention the words of Leonid Il'ich Brezhnev at the 26th Party Congress: "We, fellow comrades," he said, "now have the ability to tackle the greatest and most complex problems. But the core of economic policy is a matter which, it would appear, is simple and very prosaic--a thrifty attitude toward public welfare, an ability to fully and purposefully utilize everything we have. The inititative of labor collectives and party and mass organization work should aim at this. Technical policy, capital investment policy and the system of planning and report indicators should aim at this".

The problems of a thrifty and economical attitude toward the national well-being have enormous economic and psychological value. We can not tolerate having even a small part of the valuables created by human labor irreplaceably and uselessly lost, spoiled at construction sites or during manufacture, or during transport and warehousing. The importance of this problem for the national economy as a whole and specific means to

tackle it were de fined in a resolution adopted in Jun 81 by the CPSU CC and the USSR Council of Ministers entitled "Intensification of economizing and efficient utilization of raw material, fuel and energy, and other material resources".

A year elapsed after this document had been published. What was done during that time? Some organizational work was carried out. Party organizations started paying a great deal of attention to these problems. Ways to intensify economizing conditions were disucssed by the boards of ministries and agencies; planned measures were drawn up and approved; orders and instructions were published; and agency and interagency commisions were formed. Some shifts have also taken place in practice.

Good Examples

The CPSU CC gave a high evaluation to the initiative of the 'Gidroproyekt' institute to reduce the estimated cost of planned facilities. The stimulation of planning and construction organizations carried out in Belorussia based on experience in East Germany deserves steady attention and support for their attempts to cut the estimated cost of construction and material and labor expenditures.

We have good examples of successful incorporation of up-to-date resource-saving technologies and efficient materials. The use of form-free shaping of reinforced concrete items on long benches with oil heating at the enterprises of USSR Mintyazhstroy in the Sverdlovsk oblast and USSR Minpromstroy in Belorussia are reducing the consumption of metal by 30 percent and more per cubic meter of production and halving thermal energy consumption. At the 'Barrikada' union of Glavlenstroymaterialy, a locally elaborated thermal energy economizing program is being implemented in the production of modular reinforced concrete. As a result, by late 1982 energy consumption per cubic meter of articles will be reduced to 2/3 of its previous level.

The excellent initiative was displayed by party and management agencies of the Krasnodar and Stavropol krays, Georgia and Dagestana, where applied measures are being taken to make all-round utilization of geothermal waters. They are using the heat at construction material and design enterprises, for residential heating and hot water, to heat hothouses and fisheries. This is already saving as much as 400,000 tons of fuel per year.

Hundreds of tons of steel and thousands of cubic meters of crushed stone are being recovered at reinforced concrete plants in Moscow thanks to the use of special machines to crush the concrete and extract the reinforcing rods. Timber waste is being sent to the arbolite plant of the 'Rosmezhkolkhozstroy' organization.

There are many such examples that can be cited. But the wide dissemination and routine incorporation of up-to-date experience in resource management has yet to material. The construction ministries and agencies, as well as USSR Gosstroy are chiefly responsible for this, since the latter is supposed to be the conduit for what's new and up-to-date in construction.

We must, unfortunately, realize that they have mainly been doing "paper shuffling". No turning point, no fundamental improvement in the use of material resources throughout the construction industry has occurred. The engineers are not doing enough to tackle these problems and the experience of innovators and the initiative of the leading collectives are not receiving sufficient encouragement and dissemination. Work on economizing and saving has yet to become specific and business-like. The bottom line is that the tremendous losses of construction materials, supplies and parts go on.

Losses -- the product of mismanagement

It is no secret that the total losses of cement during production, transportation and consumption at construction sites come to about 12 percent of all cement produced. More than half of this amount is lost simply because of shipment via the wrong type of transport means, repeated transshipments and storage in unmodified compartments. The remaining loss is the result of poor production efficiency, the use of poor quality concrete aggregate and other omissions. For these reasons, in the past year, the 'Odessapromstroy' enterprise group, for instance, used 20 percent too much cement, the enterprises of Glavaltaystroy 18 percent and the Nakhodka reinforced concrete plant of Mintransstroy 21 percent.

Roughly one-fourth of the glass produced in the country never gets used. Each year nearly half a million tons of reinforcement steel and wire, millions of cubic meters of construction mortar, 2,000,000,000 bricks, 15,000 tons of varnish and paint, almost 4,000 cubic meters of lumber are lost or inefficiently consumed. Overall, material resources lost in construction come to almost 2,000,000,000 rubles per year.

I am citing these figures to give a clear picture of the results of individual cases of mismanagement taken together, with our enormous scale of production. At constructions sites it is common to see graded planking which has been sheared by bulldozers, pipes and sheet metal coated with rust due to the lack of preventive coatings, broken reinforced concrete items, junked reinforcing rods and electrodes. Top quality boards are often burned or thrown onto the garbage heap after a single use. This too is often the fate of wooden stairs, scaffolding, skids and other stock.

The value of material resource management is especially important under intensified construction conditions. In the 11th Five-Year Plan, capital investments from all sources of financing amount to 700,000,000,000 rubles, versus 634,100,000,000 in the previous five years. This is a 10.4 percent increase. National revenues are planned to increase by 10 percent. In other words, every ruble of capital investment must produce the maximum yield in the shortest periods of time.

The final results must be achieved with the least expenditures. Putting basic funds into operation as a result of state capital investments will be 21 percent greater than in the 10th Five-Year Plan and equals 627,000,000,000 rubles. The state capital investments themselves have been determined to be 618,000,000,000 rubles, an increase of a mere 11.2 percent. The success in tackling this most complex and responsible

problem primarily hinges on the ability to economically manage available resources, to ensure strict planning discipline and economy, to actively incorporate resource-managing production technology in construction and assembly work and in the manufacture of materials, structures and parts.

Resource-Managing Technologies Get the Green Light

Reduction of material and energy intensiveness at construction sites and in the construction material industry is one of the most important problems in the national economy. The great reserves for saving thermal energy are in the cement industry, which consumes over 22,000,000 tons of fuel per annum for its technological needs alone. The economical "dry" method of cement production must be more actively developed and perfected, industrial incorporation of low-temperature saline technology and many other energy-saving processes must be accelerated. A shift to mechanical dessication of slurry provides great results. Cement enterprises have considerable opportunities to utilize the heat.

The problem of reducing the mean relative consumption of fuel in the production of modular reinforced concrete requires the most fixed attention. This concerns the incorporation of the most economical methods of heat treatment of items. Many resource-saving measures, indeed, do not require capital expenditures. According to expert opinion, more than 250 plants in the south can produce reinforced concrete with high efficiency on open test tracks, replacing steam-curing with natural exposure.

We must touch upon the use of gypsum in particular. Of all the materials employed in construction, it has the lowest energy-intensiveness. Relative energy consumption per square meter of gypsum walls is only 1/3 of that for brick or reinforced concrete. In addition, these designs are lighter, and easier to manufacture, treat and assemble.

At this point in time, only at Glavmosmontazhspetsstroy have they found it worthwhile to evaluate and skilfully use the advantages of sheetrock as industrial dividing walls. Frame component production has been set up, specialized brigades and links have been established, documentation has been prepared. With tremendous savings of resources, the subdivisions of the central burea have assembled more than a million square meters of sheetrock walls, both in industrial and residential buildings. Thus, a model does exist. Gypsum, an economical material, should find its due place in the plans of the construction ministries for new technology.

I will also note that other problems of resource saving ought to be better reflected in new technology plans. Unfortunately, Glavstroynauka, established nearly four years ago at USSR Gosstroy, has yet to take on enough leadership over sector science and has little impact on enhancing the sector's technical level.

Economics Services in the Fight for Savings

Economics services in construction have been set up almost everywhere and at all echelons. There is a chief Scientific Research Institute of Construction Economy of USSR Gosstroy, many "Orgstroy" and "Orgtekhstrom", scientific organization of labor centers, economics laboratories and departments are growing. But their product, a profound analysis of processes taking place in construction and, in particular, business proposals aimed at enhancing efficiency of construction, is rather small. The economics services of construction ministries and organizations frequently just record the facts. Many deputy trust administrators in economics have not produced all their obligations at all. Who, if not the economists, should head up the campaign to economize and save?

It would seem wise to clearly delineate the material and psychological responsibility of those involved in the consumption of resources. A general order of accounting, storage and inventory of materials should be set up, as well as penalization of guilty parties for expenditures related to defects, spoilage, overconsumption and shortages at the construction site.

In the near future a shift will have to be made to containerized and packet shipment methods for construction materials and supplies. This is a job for both the shipper and the receiver of these cargoes. The container and the packet not only preserve the quantity and quality of the materials, but they also save time and labor in loading and unloading operations, increase the work output efficiency level and create discipline.

The All-Union meeting held from 14 through 16 April in Moscow examined various aspects of economizing material resources in construction throughout the chain of command: from the plan up to and including exploitation. The meeting participants concentrated their attention on four main trends:

° improvement of technological processes, types and methods of organization of construction work, strengthening of industrial discipline;

° optimization of planning decisions, scientific research and design work;

° introduction of more economical kinds of materials and designs, and resource-saving technologies to manufacture them;

° intensification of training, development of creative activity among the masses in the campaign to economize.

Speakers at the meeting made made valuable suggestions. USSR Gosstroy, ministries and agencies and the organizing committee must carefully analyze all of the speeches and proposals, generalize them, and make them the property of everyone in the construction industry. Everything that is useful must be unremittingly be applied in practice.

Some of the speeches, unfortunately, seemed more like self-congratulatory pronouncements. Were we to judge by these reports, then we have almost everything under control in the expenditure of resources in construction. This kind of complacency only leads to confusion and does nothing but cause harm. We must critically examine what has been done, and it has not been that much. We must call a spade a spade. Every inquiry must be specific: what has actually been done, what has been produced, what has not been completed and when will it be done? Economy efforts should be measured not in terms of general conversations, but in the tons, cubic meters and kilowatt-hours. We must examine in detail, without delay, why things are proceeding so slowly, despite repeated discussions of the problem at the board level and in the face of orders and plans for many measures.

The struggle for economy has to become the primary concern of the people who head up construction, and of those individuals working right at the construction sites, in enterprises and in planning institutes.

Problems of economy should be given pre-eminence at working meetings at the brigade level, in the section, administration, shifts, enterprises, institutes and other organizational levels. Engineering and technical workers, the administrative machinery of trusts, central boards, unions, ministries and agencies must be mobilized to perform concrete organizational work to save resources. Maintenance of order in the consumption of resources should begin with the manager. Party organizations should actively join this effort and guide it.

The intensification of economization of resources is not a simple task and it can not, of course, be solved in one fell swoop. Primary attention must be focused on training highly aware individuals to have a truly thrifty attitude toward resources. The economical and reasonable attitude of every person toward the national welfare should not only become an obligation and duty, but more like a habit or standard of behavior.

A decisive battle must be fought with bad workmen, sloppy workers, malingerers, hippies and bums. It is very important that no infraction go unpunished, that no-one get away with improper delinquency, waste, forged work orders, squandering materials. It is just as important to give the conscientious worker the appropriate recognition, support and exemplification in front of others.

Our country lives in a state of high political and labor upheaval as it brings to life the historical decisions of the 26th Party Congress. Pan-national socialist competition in honor of the 60th anniversary of the founding of the USSR has opened up. All Soviet people are feverishly toiling to fulfill their obligations to complete the targets of the second year of the five-year plan ahead of schedule. An army of builders numbering in the millions is performing admirably in this constructive effort.

The decision of the All-Union Scientific and Applied Meeting made note of specific measures to strengthen the organizational and mass group work done in labor collectives, to broaden and enhance the activities of socialist competition to economize material resources, to create in the collective an intolerance toward mismanagement and non-productive losses, production of junky products and wastefulness. Things should be set up so that every enterprise and organization would have and would implement a comprehensive program aimed at a practical solution to the problem of economy in construction.

The participants of the meeting adopted the Appeal to All Workers of construction, planning and scienctific research organizations, enterprises of the construction material and design industry. It contains a call for more active participation in the Soviet campaign for savings and conservation, for meeting targets and socialist obligations for 1982 and the 11th Five-Year Plan with honor. As noted in the resolution of the CPSU CC and Council of Ministers "On intensification of work for economy and efficient utilization of raw material, fuel and energy, and other material resources":

Every Soviet person must actively join the battle for economy and conservation in industry and daily life, and must make his specific contribution to this common endeavor.

At the Construction Sites

The success of resource-saving measures implemented in the 11th Five-Year Plan largely depends on the organization of labor and production right at the construction sites. The experience of leading collectives, discussed at the All-Union Conference, bears witness to the considerable reserves of savings. The urgency of these questions continues to grow with the increased scales of constrctuion, assimilation of remote regions, and creation of new industrial centers in the eastern part of the country.

According to the data of Minvostokstroy, the cost of construction materials and designs is currently about 1.5 times as expensive in its activity region as in the central and western regions of the country. The harsh climate and complex mountainous geological conditions require an increased in the consumption of material and fuel and energy resources. The thickness of the single ply wall boards of the homes in the northern regions has been reduced to 55 centimeters. In the seismic-unstable regions, more than 60 kilograms of metal per square meter of useful living space are consumed. It costs the government about 18,000-20,000 rubles to set up accomodations for every new arrival in the Far East.

Work on economizing material resources in most construction ministries is arranged on the basis of special target programs. As minister [illegible], A. M. Tokarev said, for the 11th Five-Year Plan, USSR Minpromstroy intends to release more than 328,000 tons of sheet metal, 936 tons of

cement, 439,000 cubic meters of lumber, 107,000 tons of conventional boiler and furnace fuel, 1,700,000 gigacalories of thermal energy and 373,000,000 kilowatt-hours of electricity .

One of the leading factors affecting the economy of resources is held by the engineering preparation of production. At construction sites which have POR (organizational plans) and PPR (work production), as a rule, a strict order is observed in storing and utilizing materials and large parts. The calculations cited by S. Ye. Yakubanets, USSR minister of construction, in his speech, show that the savings achieved by performing jobs pursuant to PPRs come to 3-4 percent of the cost of construction and assembly.

An important aspect of resource saving measures is the improvement of material and technical supply and parts outfitting of construction sites. In conformity with the requirement defined in the annual schedules of plans and estimates, USSR Gossnab currently provides 27 construction and assembly organizations with a yearly work load equivalent to more tha 5,000,000,000 rubles. Party and government decisions on improving the management machinery provide for conversion of more construction sites to this advanced system. USSR Gossnab must become even more active in this area. But the builders themselves also have to do more.

A centralized servi-es has been established in Glavpoles'yevostroy to be responsible for all problems--from scheduling material and technical supplies to delivery of materials and equipment to the facilities. A concentration of resources at specialized bases made it possible to better organize storage and reduce losses and waste. After the small warehouses were eliminated, overquota reserves were reduced. It became possible to redistribute, as necessary, material and technical resources.

The effectiveness of centralized reprocessing of materials into half-finished products and items, the enhancement of their technological readiness at industrial outfitting bases is proven by the experience of 150 trusts and the DSK (house-building enterprise group) of USSR Minstroy. This measure reduced waste and losses of petroleum bitumen by 10 percent, reinforcing rods and roofing steel by 3 percent, roofing materials by 5 percent, glass by 10 percent, linoleum by 4 percent, spackle by 15 percent, wallpaper by 5 percent, paints and varnishes by 4 percent, lumber and sawed w-od products by 11 percent. It takes 5-6 years for payback of an industrial complex base. Material resources are delivered to each facility according to the outfitting schedule, which is drawn up on the basis of standardized rate fixing and technological documentation.

Introduction of the flow line method of construction combined with the assembly of large parts while on the truck or train has had a good impact on the savings of material resources. The experience of Muscovite builders in this regard is quite instructive.

Glavmosstroy is building a large number of homes and recreational facilities using a standardized flow line production method. The plant, transport media and builders are working together at a synchronized pace. Aside from the clear-cut rhythm, this makes it possible to evenly distribute resources and to reduce to a minimum the stores of valuable materials in warehouses and bases, and to reduce losses; the bottom line is that it speeds up the movement of operating funds.

The assembly of large parts right off the transport media made it unnecessary to have on-site warehouses. This saved metal available for the manufacture of plate-holders, pyramids, shelves and other warehousing equipment. The number of loading and unloading operations was reduced and consequently, the losses related to them. This method is being successfully used by all three DSKs of the central board which are erecting up to 500 housing units per year.

In the past few years, Glavmosstroy has been steadily meeting the assignments to reduce the consumption of material resources. During 1981 7,2000 tons of cement, 1,740 tons of ferrous metal rolled products were saved. This was reported by I. N. Ponomarev, secretary of the CPSU Moscow Urban Committee.

The greatest savings in material and labor resources in construction have been achieved by the self-supporting brigades. In the 10th Five-Year Plan they reduced the planned job cost by roughly 2.3 percent. Labor productivity in these collectives rose 28 percent, but only 1.6 percent in ordinary collectives. Particularly effective is the open brigade contract, which includes all cooperating parties under self-supporting relationships. The home builders of Tallin, Kharkov and Irkutsk who use this method work in rhythm, consistently reducing the specific consumption of materials. Labor expenditures per square meter of living area with the open brigade contract run one-half of the country average.

Self-supporting brigades save on the average as much as two percent of the brick and motor and five percent of lumber. About 40 percent of the entire construction program is now being done by the brigade contract method. By the end of the 11th Five-Year Plan, this should rise to 55-60 percent. Brigades of all home building enterprise groups in the country will be completely switched over to self-support in the near future.

In the Minneftegazstroy system, self-supporting complex technological flow lines are established to lay the linear section of the main conduits. Each of these groups has up to 400 men with 120-130 machines and tools. To increase the personal interest of self-supporting flows in achieving end results with a minimum expenditure of materials, fixed job production prices are set for them for the five-year plan in laying a kilometer of pipeline.

Other forms of economizing material resources at the country's construction sites were also considered at the meeting. The experience of advanced

collectives, disseminated on a regular basis, will produce a perceptible effect.

Alongside resource saving measures, however, many construction sites do not have a fundamental procedure for consumption of material resources. Valuable materials are permitted to spoil during storage and shipping, and some materials just "vanish". Additional expenditures are required for alteration of sloppy work. The meeting participants were acquainted with these facts by an unusual exhibit prepared by USSR Gossnab. In the past year, for example, this type of mismanagement caused the 'Kurgantyazhstroy' union to overexpend 3,000 tons of metal, 4,800 tons of cement, 884 cubic meters of lumber and a large quantity of other resources. Little attention is paid to problems of economizing in the 'Uralmashstroy', 'Tulpromstroy' and Dushanbe's 'Prom stroy' trusts, the 'Bryansksel'stroy' administration and other organizations, whose 'mismanagement experience' was displayed in the exhibit.

The participants of the meeting concentrated their criticism on facts such as the following: at some construction sites no procedure exists for storage and utilization of materials, machinery and tools lay idle, large parts become rusty, filth covers metal, bricks, lumber and other valuable items, defects and expensive alterations are tolerated. Someone breaks a window, someone orders too much mortar and concrete, someone makes a planning error, someone violates the rules of job production. Those directly guilty of the losses and waste must answer for all of this. The contribution of innovators to the economy must be evaluated for its merit.

In the resolution of the CPSU CC and USSR Council of Ministers entitled "On intensification of economizing and efficient utilization of raw material, fuel and energy and other material resources" it says the following:

The CPSU Central Committee and USSR Council of Ministers consider it necessary to fundamentally improve all work on economizing and efficient utilization of raw materials, materials, fuel and energy at all echelons of the national economy. Scientific and technical and structural policy, policy of capital investments, administrative system, planning and encouragement, and initiative of labor groups should be directed toward this.

In the Institutes and Laboratories

Economy in construction begins with the plan. The effectiveness of building science plans which form the basis of advnaced planning decisions largely determines not only the technical level, but also the material intensiveness of erecting facilities, expenses involved in their construction and operation.

Some interesting studies aimed at saving material resources have already formed a basis for improving effective construction standards and rules

(SNiP). This topic was covered in reports by leading building scientists. A classification has been set up for the degree of responsibility of buildings and structures when planning facilities. Three levels were adopted with coefficients 1.0, 0.95 and 0.9. Thus, the reserve of strength is differentiated and consequently, the relative consumption of materials when erecting facilities, depending on their intended purpose and tested loads. The rules of calculating the degree of responsibility of buildings and structures when planning facilities were introduced in 1981. Basedon the construction load for 1985, their implementation will save 500,000 to 530,000 tons of metal.

Steel structure design standards have been improved. They give more complete consideration to the aspect of possible plastic deformations, strength and endurance, based on specific conditions. These advanced standards save 550,000 to 600,000 tons of steel.

The incorporation of achievements in calculation and planning of reinforced concrete structures will help save 850,000 to 900,000 tons of metal and over 2,500,000 tons of cement.

An orientation toward innovations in scientific and technical progress, the creative use of up-to-date domestic and foreign experience, have made it possible for the collective of the 'Gidroporyekt' institute to take a valuable initiative. Planners promised in the 11th Five-Year Plan to reduce the estimated cost of construction of hydraulic units build according to their plans by 230,000,000 rubles; to reduce the consumption of cement by 370,000 tons and sheet metal by 110,000 tons; to reduce labor expenditures by over 2,000,000 man-days. This initiative has been approved by the CPSU CC and is now being widely promulgated.

The collectives of 'Tyazhpromelektroproyekt' and 'Teploproyekt' actively joined the campaign for savings and economy. The organizations of USSR Minmontazhspetsstroy alone, thanks to highly effective decisions of 'Tyazhpromelektroproyekt', will save about 20,000 tons of metal products and more than 1,200,000,000 kilowatt-hours of electricity. Throughout the land, this institute will save about 60,000 tons of sheet metal and more than 10,000,000,000 kilowatt-hours of electricity.

The furnace protective designs developed by 'Teploproyekt' on the basis of fire-resistant fiber materials reduce the labor intensiveness of assembly work by several orders, reduce metal consumption for the furnace frame by 30 to 50 percent, save 25 to 30 percent of fuel and electricity in operating the units.

But facts of a different type were cited at the meeting. At the institutes 'SibZNIIEP', 'Estonproyekt', 'Latgiprostroy' and TsNIIEP school buildings, up-to-date decisions are incorporated poorly and they react slowly to progressive changes in the standards documentation. In these organizations, the actual indicators of consumption of metal per unit area is way up over the standard.

Insufficient attention is paid by planning organizations to the search for the most efficient volume planning decisions. They frequently do not

utilize the opportunity to block buildings and structures, the creation of ancillary facilities common for a group of enterprises. This results in larger land parcels being used for the construction site than is necessary. The construction volumes of buildings, extent of communication and consequently, the consumption of material resources are increased.

Planners have been called upon to make a significant contribution to the reduction of fuel, electricity and other material resource consumption in the operation of new facilities. About 400,000,000 tons of conventional fuel are consumed each year for heating, ventilation and hot water supply for homes, public and industrial buildings. In new projects more attention should be given to thermal insulation of buildings. Practice shows that the arrangement of attic spaces sharply reduces heat losses. In certain areas, double-pane windows should be used for better heat retention. Walls with increased thermal opacity should be more widely used and bearing structures should be designed to reduce the structural volume of heated buildings.

Excellent experience has been accumulated from the creative collaboration of scientists, planners and builders in the construction around the deposits of the Tyumen oblast. The 'Siborggazstroy' company was set up here to handle problems of incorporating local and new economical construction materials, reducing material intensiveness of planned decisions. In contact with the Institute of Foundations and Subterranean Structures imeni Gersevanov, the USSR Academy of Science's Institute of Permafrost Management and sector scientific research institutes, plant-performed aluminization of pipes, galvanic protection of petroleum and other metallic tanks against corrosion have been organized.

Experience shows that the effectivness of planning decisions increases significantly when builders participate in the development and analysis of documentation. Expertise and Improvement of Planning Decisions offers are operating successfully with great effect in Glavzapstroy, Glavmosstroy, Glavmosoblstroy, Glavsreduralstroy, Glavsrednevolzhskstroy, Glavleningradstroy, Glavkievgorstroy and the UzSSR Minstroy.

In Glavsreduralstroy, this office examined plans for 23 facilities and in each one discovered reserves to reduce the volumes of construction and assembly jobs. As a result of promptly made correction it was possible to save the national economy 4,000 tons of metal, 6,000 tons of cement and many other materials, and to reduce transportation expenses.

While examining the fertilizer plant reconstruction and expansion project of the Kingisepp association 'Fosforit', the office created at Glavzapstroy made suggestions to alter the water supply and drainage system elaborated by the 'LenNIIgiprokhim' institute. This will make it possible to avoid constructing several facilities costing a total of 9,700,000 rubles, to reduce material intensiveness for modular reinforced concrete by 7,000 cubic meters, monolithic concrete by 5,000

cubic meter, metal constructions by 1,400 tons. In addition, 25,600,000 kilowatt-hours of electricity and 105,000 gigacalories of thermal energy will be saved. Operating expenses have been cut by 2,000,000 to 2,500,000 rubes per year.

Moreover, as they noted at the convention, there are still a lot of institutes which, in protecting the 'regimental honor', are reluctant to consider the suggestions of builders. This situation is intolerable, especially when you're talking of saving material resources.

Critical remarks were addressed at the meeting toward USSR Gosstroy. In some cases it introduces new state standards without considering the actual state of affairs. That is what happened with instructions concerning the immediate removal from production and non-application in planning of certain obsolete designs. The new requirements were found to lack the necessary material and technical base.

Saving of resources is a vital, creative matter that does not endure formalism. This thought ran through most of the speeches at the meeting.

As recorded in the resolution of the CPSU CC and USSR Council of Ministers "On the intensification of work to economize and efficiently use raw material, fuel and energy and other material resources":

Putting reserves in the serve of society is a major management problem today.

At Industrial Enterprises

In the 11th Five-Year Plan, the construction material and parts industry is faced with the problem of preferential development of products which ensure a reduction of metal consumption, cost and labor intensiveness of construction, weight of buildings and structures, and enhancement of their thermal insulation capacity.

Special attention in this direction has been focused on the expanded manufacture of high-grade, multiple component and speical cements, increased production of high-strength and insulating glass, efficient decoration materials. There are tremendous reserves to reduce the weight of heating radiators, sanitation technique items and pipes without reducing their quality. In terms of the experience of the leading enterprises, many plants can assimilate the production of hollow reinforced concrete designs, light cellular concretes, where air replaces material.

In the USSR Mintyazhstroy system alone, as minister N. V. Goldin reported, over 20,000,000 square meters of industrial areas have been built from new designs and materials at major constructions sites in the last few years. The mass application of light wall designs made of profiled sheet steel, economical thermal insulating materials made it possible to reduce the total weight of buildings by more than 6,000,000 tons, and labor intensiveness of construction

by 6,500,000 man-days. It is worth noting that a reduction in weight of buildings means not only savings of materials, but also facilitates a reduction in transport operations, loading and unloading, consumption of fuel and electricity.

Directly linked with economy in construction are the problems of improved quality and enhanced plant readiness of parts and designs. There is experience in this matter, but it is not yet being fully utilized. Assimilation of large-scale production of industrial and economical items such as decorative plates 'Sigran' and 'Plink', flat asbesto-cement sheets with electrochemical coatings, decorative films, fiberglass for construction, chemical additives--plastifiers, pressed gaskets.

Industrial enterprises have the formula and equipment to produce dry mixtures which can be used at any time at the facility to prepare the required amount of mortar or paint. But the production of these powders has yet to be set right.

At the meeting it was noted that the production of msot kinds of construction materials is highly fuel and energy intensive. Some 62,000,000 tons of conventional fuel are used each year to produce them, as well as 42,000,000,000 kilowatt-hours of electricity.

In terms of the amount of mined and processed rock, the sector stands next to the coal and metallurgy industry. Construction materials and designs occupy roughly one-third of the shipments of national economic cargoes.

Under these conditions, questions of resource saving right at the enterprises of construction materials and designs acquire particular importance. Participants of the meeting formuled the task thus: economical forms of production should be produced in the most economical manner.

Advnaced experience of incorporating resource saving technologies exists in the sector. For example, at reinforced concrete article plants in the 'Barrikada' union of Leningrad, after improving the vibrating platforms and forming units, they began saving about 600 tons of cement a year. Over 500 tons of this valuable material have been saved by producing items with negative tolerances. The union collective recently manufactured a pilot batch of products using fibroconcrete. Assimilation of new technology, especially economical technology, in the manufacture of thin-walled or very strong products, will make it possible for the union to save 5-8 percent in electricity and reduce the weight of items by 20-25 percent.

A fundamental trend in the economization of energy resources in the cement industry is the development of a so-called dry production method. This advanced technology, which promises to reduce fuel consumption by 30-40 percent, now is only used to produce 15 percent of all cement. At the same time, it will be necessary to introduce filter presses

for thorough dessication of slurry in the wet method of cement production. By the calculations of the USSR Ministry of Construction Materials, this will save up to 20 percent of the fuel consumed in the cement industry.

It has been calculated that a reduction in the moisture content of slurry by one percent is equivalent to saving 150,000 tons of fueld and an additional output of 800,000 tons of cement.

On the whole, socialist obligations for 1982 adopted by collectives of USSR Minstroymaterialov, as minister A. I. Yashin informed the participants of the meeting, predict a reduction in fuel consumption versus approved standards for 520,000 tons of 550,000,000 kilowatt-hours of electricity, 1,300,000 gigacalories of thermal energy. Plans are to save 6,000 tons of ferrous and non-ferrous metals, 2,500 tons of soda and a thousand tons of asbestos.

Absolute figures are too large. But the reserves available to the sector are even greater. Losses due to defects are too greater. In the 10th Five-Year Plan they came to nearly 250,000,000 rubles in the USSR Minstroymaterialov system.

At enterprises of USSR Minstroymaterialov and the industrial base of construction ministries, the ash and slurry of thermal electric power plants, metallurgic and phosphorus slag, wastes of mining and concentration plants and other secondary resources are still being insufficiently utilized. I. I. Ishchenko, deputy chairman of USSR Gosstroy, feels that there could be a sharp increase, quadrupling or quintupling, of the amount of industrial wastes used, especially ash and slurry of thermal electric power plants, to manufacture construction materials and parts.

ZMany cement plants have been specially constructed alonside metallurgy enterprises and even as part of them in order to reprocess blast furnace slag. Calculations show that up to 40 percent of the fuel is economized in every ton of this type of slag-portland cement.

Only 3,000,000 tons of ash from thermal electric power plants are used, while, according to the data of the All-Union Scientific Research Institute of Construction Materials and Designs (VNIISTROM) imeni Budnikov, each year over 60,000,000 tons of such wastes are generated. Further development in their utilization is held up by the unpreparedness of thermal electric power plants to ship ash. There is virtually no economic concern among suppliers and users of secondary resources to improve their utilization.

In the production of construction materials and designs, meanwhile, broken glass, waste paper, worn-out fabric and automobile tires can be employed in a wide range of uses. In the 11th Five-Year Plan, it is planned to use 20 percent more of secondary resources for these purposes than in the years 1976 through 1980. The actual opportunities will be much greater if the collection of these wastes from industry and utility refuse from the population is duly organized.

Participants of the meeting were interested in getting to know about the experience of builders of the Krasnodar kray who efficiently use geothermal heat in the production of modular reinforced concrete. This was reported by B. N. Ponomarenko, secretary of the CPSU kray committee. They are successfully transforming rice straw and hemp stalk into construction materials. These kind of reserves are literally beneath our feet in many other areas.

Serious criticism was leveled during the meeting at cooperating organizations, primarily enterprises of USSR Ministry of Ferrous Metallurgy and the Ministry of the Chemical Industry. They largely control the economization of materials and designs used at construction sites. Because the plants of the USSR Minchermet did not fulfill the production and delivery quota for low-alloy reinforcement steel, a large quantity of metal is being overconsumed in constrctuion. As a result of forced changes in rolling profiles, the overconsumption in organizations of USSR Mintyazhstroy in 1981 came to 42,000 tons. The use of high-strength wire for reinforced concrete allows a decrease in its consumption in reinforcement to 40 percent of its prior level. But the proportion of economical material in USSR Mintyazhstroy has even dropped somewhat.

Builders have had to replace planned sheet metal profiles with larger sections. For this reason, USSR Minstroy has additionally consumed 34,000 tons of metal in 1980 and 44,000 tons of metal in 1981.

Building practice is aware of many substitutes for metal. The chemical industry has been called upon to play a decisive role at this point. A ton of plastic pipe can save 7 to 15 tons of metal, depending on the diameter and wall thickness of the items. Minkhimprom, however, is not making enough of this product. Mass manufacture of formed parts for plastic pipe has also not been put right.

Builders are waiting for Minkhimprom to assimilate the production of superplastifiers for concrete, polyurethane foam components, and economical and long-lasting varnishes and paints.

The industrialists who are filling construction orders must remember and know that the results of their labor will largely define the economic nature and quality of the facilities which are being built. In the resolution of the CPSU CC and USSR Council of Ministers "On intensification of work to economize and efficiently use raw material, fuel and energy, and other material resources" it is written:

Careful consumption of raw material and materials, reduction of wastes and elimination of loss means the saving of labor of millions of people and capital investment, the increased output of products, the preservation of the environment. This largely governs the expansion of opportunities to uplift the welfare of the nation.

Competition among Builders

At the construction site and in the scientific laboratory, in the shop and in the ministry--at every work site--a search must go on for means of economization and savings. The development of socialist competition,

the role of the public in reducing material consumption and energy consumption of construction, were the subject of many speeches given by participants of the meeting.

After joining the All-Union Public Inspection, noted I. A. Lanshin, chairman of the central committee of the trade union of construction works and the building material industry, many building groups and manufacturers, scientists and planners contributed and implemented many valuable suggestions to save resources and carried out comprehensive resource-saving measures.

In construction of the Dnestr complex hydraulic plant, the Ladyga GRES has effectively used plastifying additives and ash in concrete mixtures. This saved a great deal of cement. Furthermore, the quality of concrete work was enhanced. This made the mass more flexible, more convenient to lay and easier to treat.

The public inspection is highly effective at construction sites and construction material enterprises in the Kustanay and Omsk oblasts. Notable is the experience of the Belz building trust of Moldavia's Ministry of Construction, which was reported by I. F. Kitaygorod, chief engineer and chairman of the inspection commission.

In the Belz building trust, the inspection groups and positions were created at each facility and in every subdivisions. They regularly conduct raids during which they take pictures and movies. The analysis of inspection materials is accompanied by a showing of snapshots and movies at the trust inspection commission. The result is striking. After all, sometimes a person just does not notice the mistakes around him. A view from a different angle is helpful here.

Work is being energetically carried out by inspection commissions at the Moscow DSK-3, in the 'Vostokmetallurgmontazh' trust. Unfortunately, public inspection has not yet gained full speed in some areas. The arrangements are often treated formally.

The experiences of the collective of the Osipovich cardboard and rubberoid plant in Belorussia is instructive. Annual competitions are held each year for the best suggestion to save fuel and energy resources, with young workers participating on an individual basis. As exemplified by leading enterprises in the Kemerovo oblast, the Osipovich plant has introduced pe-sonal economy accounting. Prizes are awarded for cutting the specific consumption of energy resources.

The collective of the enterprise developed a comprehensive program to save fuel and energy for the 11th Five-Year Plan which foresees the optimization of technological processing conditions and utilization of secondary resources. In 1981 they saved 834,000 tons of conventional fuel, 2,900 gigacalories of thermal energy and more than 2,000,000 kilowatt-hours of electricity.

During the All-Union Public Inspection, members of the building trades of the country, according to preliminary data, contributed more than 400,000 suggests, of which 300,000 have already been incorporated and yielded savings of over 700,000,000 rubles.

Meetings of the PDPS (permanent industrial convention) and working meetings with the unified agenda "Economics must be economical" have had an uplifting effect in labor groups. This has produced 55,000 suggestions saving over 150,000,000 rubles. Thousands of groups revised prior commitments to save raw material, fuel and energy and reached for higher goals.

The initiative of the 'Gidroproyekt' institute was supported by 55 planning organizations in USSR Gosstroy; they defined specific steps to save resources in constructions based on the introduction of up-to-date scientific and technical experience.

There are people to emulate and examples to follow in the sector. But advanced experience is not being actively enough disseminated. The entire arsenal of means should be steadfastly and operatively used to support initiatives connected with the economization of material resources, and innovative achievements must be promulgated. The central committee of the sector trade union holds the front line in this effort.

The competitive benchmarks for builders have been clearly defined by the resolution "On all-union socialist competition for successful fulfillment and surpassing of goals of the 11th Five-Year Plan":

The CPSU CC, USSR Council of Ministers, All-Union Central Council of Trade Unions and Komsomol central committee have emphasized that the following should be the slogan of competition: "Work efficiently and with quality!" That means having a thrifty attitude to the public welfare, cleverly and efficiently utilizing all available resources, the entire industrial potential, achieving maximum results with minimum expenditures. The efforts of competitors are to be focused on accelerating the growth of labor productivity, enhancing the quality of products, saving raw and other materials, fuel and electricity, on better use of operating capital, unconditional fulfillment of product delivery quotas at the fixed times and with the correct product assortment.

The following is to be ensured on this basis:

A reduction in construction time, putting industrial capacities into operation on time or ahead of schedule, and the same for recreational facilites and housing, a decrease in the number of incomplete construction projects, an acceleration of reconstruction and technical re-outfitting of operating enterprises....

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LOSS OF CEMENT IN TRANSPORT CRITICIZED

Moscow STROITEL'NAYA GAZETA in Russian 18 Jul 82 p 2

[Article by K. Kapsuletskiy: "Transport and Cement: Why Are the Losses of This Valuable Raw Material En Route from Plants to Construction Sites so Great?" under the rubric "Economic Survey"; passages rendered in all capital letters printed in boldface in source]

[Text] EVERY EIGHTH TON OF CEMENT PRODUCED IN THIS COUNTRY UNFORTUNATELY DOES NOT REACH ITS FINAL DESTINATION--THE CONSTRUCTION SITE. AND EVEN WHEN IT DOES, IT IS UTILIZED IN AN EXTREMELY INEFFICIENT MANNER. THE RELATED DIRECT AND INDIRECT LOSSES EQUAL THE OUTPUT OF EIGHT TO 10 LARGE CEMENT PLANTS--ENOUGH TO BUILD A TOTAL OF 1,272,000 DWELLING UNITS.

AN ATTEMPT TO IDENTIFY THE PRINCIPAL CAUSES OF THESE LOSSES AND THE WAYS OF ELIMINATING THEM HAS BEEN UNDERTAKEN BY THE EDITORS, BY PUBLISHING MATERIALS UNDER THE RUBRIC "CEMENT IS THE BREAD OF CONSTRUCTION." THE FIRST RESPONSE RECEIVED WAS A LETTER FROM V. PODLESNYKH, CHIEF OF THE MAIN INDUSTRIAL CONSTRUCTION ADMINISTRATION AT THE USSR MINISTRY OF CONSTRUCTION INDUSTRY, "SELECT A VECTOR OF INTERESTS"(STROITEL'NAYA GAZETA, NO 55, 7 MAY 82), DESCRIBING HOW THE PROBLEM OF A MORE EFFICIENT UTILIZATION OF CEMENT IS BEING SOLVED DIRECTLY AT CONSTRUCTION ENTERPRISES.

But today transport will be the topic. Analysis of the responses received from ministries and departments indicates that this is the weakest technological link in the chain of cement handling. It is precisely in transport that direct losses of cement are about 5 million tons, owing to loading into unsuitable freightcars,defects in the hermetic sealing of specialized means of shipping and the faulty design of the related unloading devices, and failure of suppliers to adhere to the technology of loading cement cars.

The principal means of transporting cement--railroad tankcars and hopper-type cars--are manufactured by two of the nation's largest machine-building ministries--the Mintyazhmash [Ministry of Heavy and Transport Machine Building] and the Minstroydormash [Ministry of Construction, Road and Municipal Machine Building]. They act not in isolation from one another but jointly, on a co-production basis, which in itself, in theory, presupposes efficient coordination of activities and unity of interests. But as can be seen from the letter by the chief of the technological administration at the Minstroydormash, Yu. Govorov, it is precisely in these qualities that the partners are deficient. "In working out the complex whole of special-purpose transport it had been assumed that the Mintyazhmash would increase the output of cement tankcars and discontinue the

production of the inefficient hopper cars. But the Mintyazhmash not only has failed to increase the output of the tankcars but also is steadily continuing to increase the output of hopper cars. It is this that results in considerable loss of cement owing to seepage through loosely closing hatches and apertures."

Ye. Matveyev, deputy minister of Mintyazhmash has, instead of objecting, even corroborated with exact figures Yu. Govorov's claim. He notifies as follows: "In order to transport cement, as ordered by the Ministry of Railways, the Kryukovskiy Rolling Stock Building Plant has during the 10th Five-Year Plan built 13,000 hopper cars, while the Zhdanovskiy Heavy and Transport Machinery Association has built 6,090 pneumatically discharging tankcars. It is expected that during the 11th Five-Year Plan 12,870 hopper cars and 1,600 tankcars will be built."

But Ye. Matveyev maintains a delicate silence as regards the reasons why the ministry has unilaterally decided to reduce the production of precisely these special-purpose railroad cars which are supposed to put an end to the loss of cement en route. To what extent then are the hopes placed in tankcars justified? Let us examine the matter.

STROITEL'NAYA GAZETA has already more than once discussed the problem of the technical condition of the fleet of cement-carrying freightcars, especially tankcars. But what is the opinion of those who directly deal with the various means of transporting cement? F. Kravtsov, the chief of the transport-raw materials and concrete mixing shop at the Rostov-on-the-Don Reinforced Concrete Products Plant declared: "The tank as a container for transporting cement has done a good job, but currently 90 percent of the railroad tankcars are unsuitable for unloading, since as a rule their air-duct systems fail to operate and the internal punched tapes are clogged and torn. The topside loading hatches do not close because they are coated with concrete and lack some of their fittings, or even are completely absent in 10 percent of the incoming tankcars. The bottom discharging hatches are not hatches but holes in the tankcar. Before cement is charged in, these holes are often stopped up with paper or rags."

What is the problem? Is it design shortcomings or is it failure to adhere to the instructions for tankcar maintenance? Experience shows that the tankcar design definitely needs to be refined.

Deputy minister Ye. Matveyev assures: "Certain efforts in this direction already are under way. Currently the design of a new three-section cement tankcar with more reliable pneumatic discharging is in the development stage."

There is no doubt that experts will try to endow their brainchild with a broad variety of first-rate technological characteristics. But it can be confidently stated that in the new three-section tankcar the so-called "concrete nuts" will not be cracked, so to speak. The point is that nearly all cement plants routinely charge into tankcars cement whose temperature reaches 100 and sometimes more degrees Centigrade. While in travel, foci of baking arise in the cement mass and grow like snowballs.

Extracting these "nuts" from the tankcars is a laborious chore. Hundreds and thousands of tons of ruined mortar have to be transferred from the freight-yard onto dumps. And the tankcars themselves, following such unloading, if it can be called so, as a rule require a complete overhaul. The number of tankcars unfit for mechanized unloading, as specified in F. Kravtsov's letter, is in no way exaggerated: this is the reality with which primarily the railroaders have to deal each day.

V. Gin'ko, deputy minister of railroads, advises: "Currently 35,000 access tracks adjoin the railroad lines, with more than 300,000 freightcars being processed simultaneously on these access tracks and 30,000 persons being occupied in monitoring the related operations, inclusive of checking the weight of shipments and the loading and unloading procedures, as well as processing the bills of lading. The numbers of this personnel are insufficient to assure effective monitoring, and it is not possible to add to them. The solution to the situation lies in increasing the responsibility of customers."

As known, appeals alone will not increase responsibility. This can be accomplished either by creating a system of various sanctions or introducing an effective system of incentives. The Ministry of Railroads, of course, resorts to the measures available to it: currently, fines for providing dirty rolling stock have been increased to 15 rubles per ordinary freightcar and 30 rubles per special-purpose freightcar. Special-purpose inspections are carried out and their findings are transmitted to the offices of public prosecutors for transport affairs and committees of people's control.

Attempts at practical discussion with the concerned parties are made. Last year the problems of transporting cement and utilizing cement-carrying rolling stock were examined at a conference attended by representatives of the USSR Ministry of the Construction Materials Industry, the USSR Ministry of Nonferrous Metallurgy, and the Ministry of Chemical Industry.

Thus, the desire to eliminate shortcomings is here, and the right decisions have been adopted. What remains is the "minor" detail of carrying them out.

For many years builders have been demanding that cement suppliers load cement-carrying rolling stock to full capacity: the average loaded cement-carrying freightcar is 5-8 tons lighter than specified on its bill of lading. So much rolling stock could have been saved, let alone other expenditures, had the freightcars been loaded fully. The cement plants always justify themselves with the same answer: the lack of proportioning devices. But Yu. Govorov, the chief of the technological administration at the Minstroydormash advised as follows concerning this matter: "The USSR Ministry of the Construction Materials Industry has received from the Minstroydormash facilities for loading by weight. However, many cement plants, and especially the "Gigant" Cement Plant in Voskresensk, have not installed these facilities."

How did it happen that in this particular case the subsector's heads failed to display a responsible attitude and get their subordinates to install the received proportioning hoppers? The reason apparently is to be sought in the tacit practice

Of "padding" - records adopted at many cement plants. For if freightcars are loaded fully with cement the plan of the output and sales of cement will no longer be fulfilled on paper, since its fulfillment has long been based on the number of freightcars dispatched to customers.

Unfortunately, this is not the only subterfuge employed by cement plants in order to make their performance look better on paper. They have succeeded in adapting and, over many years, successfully utilizing for their purposes even the system of state standards. Consider the GOST [All-Union State Standard] 10178-76 as an example. It is precisely owing to this standard that cement suppliers load freightcars with hot cement and still retain a clean conscience. That standard also does not restrict the provision of spuriously setting cement.

How does this profit the consignors? First, they can claim that the cement is of a higher grade than it actually is, since it is not stored for the period of time required prior to subjecting it to standard tests (this requirement is applied only to the customer who, as a rule, finds it impossible to wait long for the results of cement analysis). Secondly, this standard allows treating cement with inactive additives in excess of the norm.

To the economy this means a considerable excess consumption of cement, "concrete nuts" that have to be discarded, and damage to tankcars. Now we understand why the Mintyazhmash has decided--incidentally, with the approval of the Gosplan--to reduce sharply the production of expensive tankcars that are difficult to repair and to offset this by increasing the production of inefficient hopper cars.

This also accounts for the dissatisfaction caused at the USSR Ministry of Building Materials by the correspondence concerning "The 'Revolving Door' Dispute" (STROITEL'NAYA GAZETA, 29 Jan 82) on the problem of leased cement-carrying rolling stock. Violating the railroad regulations, the suppliers treat that rolling stock arbitrarily.

This newspaper has already more than once described the advanced knowhow of certain construction-industry enterprises which conclude cooperation agreements with railroad stations and accept for maintenance specific numbers of freightcars. This not only assures good condition of rolling stock but also increases the responsibility of consignors to their regular customers. The advantages of this practice should be obvious.

But this is not the opinion at the Glavvostoktsement [Main Administration of the Cement Industry of the Eastern Regions], which the heads of the ministry asked to respond to the comments of this newspaper. V. Avdeyev, deputy chief of that administration, replied to the Editors as follows: "The leasing of cement-carrying rolling stock of the Ministry of Railroads to freight consignees adversely affects the utilization of that stock, which is impermissible given the current shortage of such freightcars. We believe that all the leased cement-carrying rolling stock should be immediately returned to the Ministry of Railroads." And further, he specifies just as categorically the urgent steps that should be taken by the Ministry of Railroads--what should be "prohibited" and what should be "discontinued."

As regards any specific response of that administration to this newspaper's critical comments, the letter contains just two pertinent lines, which essentially are not binding on anyone or anything: "At the same time, please be advised that all cement plants under this administration have been instructed to clean and repair cement-carrying hopper cars."

There seems to be no end in sight for this epistolary exchange among agencies defending their own strictly local interests. In the meantime, for all this ado, cement is silently being lost. Not hundreds, and not even thousands, but millions of tons of cement settle on the ground or drip onto it.

1386
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NEW FINANCIAL STIMULUS FOR MACHINE DEVELOPERS NOT A BOON TO USERS

Moscow EKONOMICHESKAYA GAZETA in Russian No 32, Aug 82 (signed to press 2 Aug 82) p 19

[Article by S. Chukin, deputy chief, preparatory shop, ZIL Production Association, and A. Zelenkov, chief, department bureau: "Actual and Imaginary Effects: Economic Mechanism of Intensification"]

[Text] To strengthen the economic interest of workers in the development of progressive equipment and effectively bar the road to mistaken technological solutions, a bonus system based on the effectiveness of new equipment has been introduced and limiting prices are being calculated.

Under the established procedure, the limiting price for new special-purpose and unitized metalworking equipment is determined by the customer and agreed upon with the developer (the design bureau), If the limiting price exceeds the projected wholesale price by 15-20 percent, the new equipment is regarded as economically effective and the order placed is accepted. The developer is assured of specific incentive funds, since an effectiveness surcharge is added to the wholesale price. Yet sometimes the customer has to order equipment analogous to what is already in use.

The basis for the modern pool of metalworking equipment for large-series and, especially, mass production of machinery is represented by special-purpose and unit-head machine tools grouped into mechanized and continuous-flow automatic lines each of which is, as a rule, designed to machine a particular component.This equipment has in most cases already reached its maximum technically feasible productivity which cannot be further enhanced unless fundamentally new machining techniques are employed.

At the same time, it is necessary to replace discrete machine tools belonging in continuous-flow and automatic lines and expand production capacities by means of new equipment analogous to what is being used. But the developers classify such equipment as qualitatively new and demand of customers that they pay for it in the limiting prices applied to equipment of high economic effectiveness.

A difficult situation arises. Plants cannot order new special-purpose and unit-head machine tools analogous to those already in use, since they are not economically

effective and developers do not accept orders for them. More effective equipment has not, on the other hand, been developed. The only way out is to order replacements by agreeing on paper that they are more economically effective.

Such a method of turning ineffective machine tools into supposedly fundamentally new and highly productive equipment entails negative consequences:the appearances of development of more effective mass production are created and steps are not being taken to develop fundamentally new equipment.

Thus, following the conversion of the design subdivisions of the Ministry of Machinetool and Toolmaking Industry to the new system of incentives contingent on the economic effectiveness of new equipment, a majority of the special-purpose and unit-head machine tools ordered by our plant with the object of expanding its production capacities and replacing worn equipment has on paper become highly effective and fundamentally new equipment. This is usually done quite artificially by comparing the ordered equipment with general-purpose machine tools which have long since ceased to be used in production, or by underestimating the productivity of the equipment being replaced. If, however, the limiting prices of the new equipment are calculated on the basis of the actual indicators of the equipment being replaced, the development of analogous machine tools proves to be economically ineffective.

Analysis of the trends of economic effectiveness of special-purpose and unit-head equipment designed for mass production in the automotive industry points to a need to replace it with fundamentally new equipment.

The first unit-head machine tools at the ZIL [Moscow Automobile Plant imeni Likhachev] had been installed in the late 1940s. The retooling of production on the basis of their mass introduction to replace the previously used general-purpose equipment was carried out in the 1960s, which greatly enhanced the economic effectiveness of the machining of components. On the average, every unit-head machine tool produced savings of 6,000 rubles annually.

In the subsequent period, unit-head tools began to be used at the plant chiefly to expand production capacities and replace analogous worn equipment. The machine tools installed in the 1970s and 1980s had as a rule somewhat higher productivity compared with their earlier installed counterparts, but their wholesale prices were much higher. As a result, their introduction led in some cases to a rise in production cost. A similar pattern prevailed with regard to other types of special-purpose equipment.

Some of our suppliers--the machine tool building enterprises--do not take the path of developing fundamentally new equipment and instead further refine traditional designs, broaden their applicability, and in general markedly complicate the design of machine tools. For example, the newly developed models of grinding machines for machining the cams of the distributing shaft are equipped with a digital programmed control system and other elements expanding the range of their applications. Their cost is greater by a factor of 2.5 than that of the old models built by the same enterprise. Every such new machine tool requires, moreover, a twice as large space for installation. The result is that while the productivity of the new model is only 4 percent higher, its operating cost is nearly 4,000 rubles annually higher.

It seems to us that the system for planning the production of new equipment and awarding bonuses to its developers needs further improvement. In particular, it would be worthwhile to reexamine the incentives granted to developers of traditional equipment for its quality and promptness of delivery.

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BASIC PROBLEMS OF MECHANICAL ENGINEERING AT PRESENT TIME

Moscow MASHINOSTROITEL' in Russian No 7, Jul 82 (signed to press 28 Jun 82)
pp 11-13

[Article by V. K. Frolov, corresponding member of the USSR Academy of Sciences, director of the Mechanical Engineering Institute]

[Text] The basic problems of machine builders in the very near future will be: an improvement in the quality of the manufactured machines, equipment and devices; an increase in their technical standards, reliablity, life; the creation of automated control systems for machines and technological processes; and the development of basically new machines and devices. These problems are also faced by the Mechanical Engineering Institute imeni A. A. Blagonravov USSR Academy of Sciences (IMASh AN SSSR) which is working on the solution of the main problem -- the creation of a new ideology for designing machines on the basis of modern achievements in mechanical engineering, mechanics, ergonomics, physics, chemistry and materials technology with wide utilization of the multifaceted possibilities of computer methods and facilities, taking into account ecological requirements. Today the IMASh AN SSSR is the leading institute of a general-technical profile, solving scientific problems, important to the entire machine building industry. Since its creation (1938) it has occupied a prominent place among the largest scientific establishments in the country.

In a brief characterization of the results of the scientific activity of the institute, the following may be noted.

A scientific school was created in the area of mechanisms and machines theory, which determined the greatest successes of Soviet machine building in creating many new machines and devices. Urgent problems of the dynamics of mechanisms and machines have been solved, including the dynamics of systems with variable parameters. The basic principles for self-adaptive machine control systems and the manipulator design theory were developed considerably.

Scientific bases were developed for the theory of precision in machine building, the theory of nonlinear machine vibrations and a new ideology for creating vibration action machines.

Wide investigations were made in the area of the strength of machine parts related to the determination of limiting conditions criteria and the study of the mechanics of the destruction of typical machine components.

All-around investigations were made of stressed states and strengths of heavily loaded structures and their components under static, dynamic and thermal loads. Investigations were developed of the strength of a load-carrying machine and machine component parts made of new, composite materials. Experimental methods and facilities for investigating deformations and stresses at variable and high temperatures were developed. A scientific school was formed at the institute in the area of the strength of machine building materials whose work is widely known in our country and abroad.

On the basis of the methods developed and its facilities, the institute carried out investigations of the strength characteristics of nuclear power reactors for the Novovoronezhskaya and Kol'skaya AES, and nuclear electric power plants in the ChSSR, GDR, Bulgaria and Finland.

The results of the institute's investigations in the area of strength were used as a basis for a number of State Standards.

A scientific school was created to study friction, wear and lubrication and is widely recognized. The institute became a leading scientific center in the country in developing basic studies in friction. A theory was created for calculating machine parts designs resistant to friction and wear. Investigations were done of the carrying capacity of friction pairs, operating under conditions of superlow and high temperatures, high vacuum and aggressive media. Theoretical bases were developed for designing friction bearing units with various types of lubrication.

Methods for calculating the wear of machine parts at dry and interfacial friction were approved by the USSR Gosstandart as reference materials. New antifriction and friction materials and coatings were proposed.

For the first time, the institute formulated problems in protecting man from vibration and solved a number of problems in the dynamics of the man-machine system. Scientific bases were developed for selecting norm criteria for vibration effects and the active protection of man, with automatic fine tuning of vibration frequency, taking into account the functional and physiological characteristics of man.

The Institute of Mechanical Engineering AN SSSR is rightly considered a school for the preparation of highly qualified scientific cadres of scientists-mechanical engineers, created by the leading academicians of our country. Eleven scientists of the institute were awarded honorable titles of "Merited Worker of Science and Engineering of the RSFSR," twelve scientific staff workers are winners of the USSR state bonuses. The IMASh AN SSSR received a number of honorable diplomas and certificates from the USSR VDNKh, while its staff workers were awarded more than 200 medals from the exhibition.

Scientific symposia and conferences regularly conducted by the institute attract a wide audience of scientists, engineers and technicians of industrial scientific research organizations. Since 1965 the institute has published the MASHINOVEDENIYE journal. Fifty-five "Machine Mechanics" manuals were published on urgent problems of the machines and mechanisms theory, as well as a series of manuals on "Friction and Wear in Machines," "Transactions of a Seminar on the Theory of Precision" and Transactions of a Seminar on Reliability Problems." IMASh staff workers participated

in the preparation of numerous references: a "Machine Building" encyclopedia in 15 volumes, "Vibration in Equipment" in six volumes etc. Many inventions of the staff workers of the institute were successfully patented abroad guaranteeing international recognition of scientific developments.

The successful solution of new problems in machine building and the acceleration of scientific technical progress requires working on problems related not only to improving modern machines, but also creating machines of the future.

Such machines must be of high quality, have high unit and total power, low energy consumption, high reliability under various operating conditions, including extreme ones: in a corrosive chemical medium, at superhigh and superlow temperatures, at high pressures or high vacuums. They should have a high level of mechanization and automation in all areas of production; higher labor productivity and quality of output; improvement in labor conditions in every way; protection of the environment and rational utilization of material resources.

As far as such important characteristics as reliability and long life are concerned, they must be determined not only for individual product units, but also for the entire machine complex in the given system. Therefore, problems of providing equal strength and equal wear resistance, solved for individual cases, must be optimal also for entire machine systems.

A great deal of attention is being given to the development of industrial robots as universal facilities for automation. Work is being done in investigating robot systems as a whole. Work has been completed on classifying the structure, kinematics and dynamics of industrial robots which is used widely when robots are being designed.

The development of robot systems requires the solution of a number of scientific technical problems, presents a complex problem and combines methods and facilities used in the machine theory and automatic control theory, in cybernetics and computers, and requires the joint efforts of various specialists.

Thus, as applied to robots, there has originated the problem of the further development of the structural, kinematic, dynamic analysis and synthesis of actuating organs (artificial limbs of manipulators and robots). We are speaking not only of traditional methods in the theory of mechanisms, but also of developing new approaches that make it possible to obtain integral evaluations of the structural, kinematic and dynamic properties of large kinematic loops. Only the extensive study of human motor possibilities, his kinematic, dynamic and power characteristics make it possible to design the technical part of the system on an optimal basis.

Still more complex problems originate in designing industrial robots with automatic control. Such a form of production automation is important in the social aspect (human labor is replaced in heavy and tiring work), as well as from the standpoint of economic efficiency. It is very important to raise the "intellectual" level of robots, equip them with artificial sensing organs and minicomputers. Such a system contains algorithms and programs that realize the functions of recognition and control, providing for the solution of motion and technological problems. In the

Mechanical Engineering Institute AN SSR a block-diagram model of a sensitized robot was developed, proposed for studying the processing of various algorithms to control motion, taking into account situations in the activity zone of the robot, and created a special device -- "information surface."

Modern scientific development is characterized by the automation of the scientific investigation process and the wide application of mathematical simulation methods.

Using mathematical methods and computers to solve many investigating problems makes it possible to increase the labor productivity of scientists, reduce the investigation cycle and solve those scientific problems which could not have been solved by other methods. On the basis of successes of computing mathematics and new generations of computers, the institute has developed and introduced a method for selecting optimal parameters that made it possible to take into account basic (including contradictory) requirements of the machines and mechanisms being designed and to create highly reliable and economical machines with a minimum use of materials.

The basic directions of the economic and social development of the country specify a reduction in the metal consumption norms in machine building and machining by not less than 18 to 20% on the average. In this connection, the given problem must be solved by saving metal, improving the metals used, as well as improving the technological processes for their manufacture. More compact machines and equipment require smaller production areas, lower transportation costs and capital investments, and insure a considerable saving in materials and money.

To reduce the structural metal content of machines, scientists search for new solutions on the basis of creating rational arrangements and joining, using strengthening physio-chemical, thermal and mechanical processing of parts etc. In our institute, for example, on the basis of investigation of the mechanical properties of composite materials at temperatures from -196 to 200°C at static, high speed and cyclic loading, scientific bases are being developed for optimizing structures made of composite materials (according to criteria of minimal mass with given characteristics of strength, rigidity, and acoustical and thermal fatigue). This will make it possible to reduce the total weight of machine building products by several thousand tons, with a considerable saving of light alloys. Thus, the use of composite polymer materials in type "Zhiguli" motor vehicles will not only save a considerable amount of metal, but also 15 to 20% of gasoline due to the considerable reduction in weight.

Machine building is called upon to play an important role in aiding agriculture in developing a comprehensive food program. For this purpose, the institute organized work to increase the reliability and life of the loaded parts of the "Niva" combine. Investigations are being done on the friction parts of the "Niva" combine, the reliability and strength of load-carrying structural components, the vibration safety of the machine operator system, and new proposals were made on raising the operating time of this machine.

The creation of new machines and designs is possible only by the advanced development of fundamental scientific research in all main directions of scientific technical progress. In creating new, and improving existing machines, all new achievements of science are being used which radically change machine properties and intensify their characteristics.

The theory of vibrations is very important from the viewpoint of the advanced development of science (with respect to equipment and production). The basic conclusions of the theory of vibrations in multiphase media have already found applications not only in technological processes, but also in eliminating dangerous and harmful vibrations, acting on man, as well as on machine components. The investigation of machine vibration is very important in order to insure its reliability. Inasmuch as it is impossible to eliminate vibrations fully, an attempt is being made to reduce them either by increasing the strength of the machines or by stabilizing their programed motion. Proceeding from these basic conditions, machine parameters are selected in the design process. In this case, previously, it was not always taken into account that the machine is operated by a man subject to machine vibration along with other factors. When vibration loads exceed some limit for a certain time, they may cause a vibration sickness that afflicts the nervous, cardio-vascular and motor systems of humans. Moreover, the effect of vibration on the human operator in the process of operating the machine leads to a reduction in the quality of control. This leads to the necessity of investigating two problems: first, the effect of vibration on the human operator as a biomechanical system and, secondly, the dynamic interaction between the controlled machine and the human operator.

The solutions of the given problems require the carrying out of a wide range of theoretical and experimental investigations, the participation of specialists of the most varied fields of knowledge (mechanics, physicists, biologists, medics etc) and, primarily, rich experimental material is needed.

Obviously, in the not too distant future, the results of all-sided and extensive investigations will make it possible not only to avoid the harmful effects of vibrations, but also to insure vibration stimulation of human labor activity. The study of vibration phenomena in humans as in a biochemical system and their effects on occurring biological processes -- this is an urgent problem of biomechanics of today. Perhaps on this bases, in time, vibration-curing machines will originate on earth and in space? These would be curing and prophylactic machines of the future in the broadest sense of the word. The science of wave processes in man's organism awaits its further development.

The solution of acoustical machine dynamics has become a large scientific problem. To produce theoretical bases for this new direction and implement measures for a considerable reduction in machine noise, methods were developed to minimize the acoustical energy by mutual compensation of the energy sources themselves, defects and deformations, as well as possible forms of forced vibrations. Methods were proposed to optimize the machine design by criteria of minimal vibration activity.

Vibration diagnostics is an interesting direction of these investigations. It makes it possible to monitor the current state of the machine fully, but also provides for the necessary quality stability of units and parts according to vibration indicators in the process of production.

The development of work on vibration acoustics of machines is directed toward solving such problems as the development of methods for designing low-noise mechanisms, as well as methods and means that insure the stability and high quality of machines in accordance with vibration acoustics criteria. It is necessary to

create such machines, whose characteristics will be able to satisfy the requirements of environmental and health protection.

All-around acceleration of the development of scientific technical progress and the increase in the efficiency of scientific investigations necessary for this are related to the reduction in the times for their implementation in the national economy. The accelerated introduction of the achievements of science and technology in production -- is one of the main problems at the modern stage of the development of machine building. Recently, the party and the government have turned special attention to the necessity of the optimal functioning of all links of the complex chain, going from fundamentals to applied research through developments, design and introduction into production, as well as in the reverse direction -- from production again to science.

Concrete organizational forms of ties between scientific establishments and industrial enterprises vary. These are the development of a "plant shop" science, experience of leading scientific-production associations, the "introduction belt" of the Siberian branch of the AN SSSR where around an academic settlement, there are created a number of design-technological bureaus and experiemntal production facilities.

The realization of scientific research results -- is a complex concept, that characterizes the degree of utilization of new achievements in science and technology in the production process for minimal labor, material and financial expenditures.

In this case, it must be possible for the enterprise to obtain financial means (from centralized funds, credit or its own resources), sufficient to cover higher costs during the assimilation of new euqipment. To do this work it is necessary to prepare the necessary material-equipment facilities, carry out technological and organizational rearrangements of the production process and train cadres which will produce and assimilate the new equipment. The introduction itself should be considered as a special process which is complex, mutually interrelated organizational-economic, scientific-technical and social in a certain sequence.

From year to year, the Mechanical Engineering Institute systematically introduces its scientific achievements into all the largest machine building industrial sectors of the country. The forms of this introduction differ: making robots directly on orders of interested organizations and entreprises; joint research on contracts of scientific technological cooperation (the results of research in the given case are transferred to a number of organizations for practical utilization); wide publication of the results of the institute's work that provides the scientific technological public with data on the required methods and facilities for introducing new achievements into the national economy; development of new GOST and methodological materials jointly with the USSR Gosstandart.

The results of the scientific research of the institute were realized in some of the largest enterprises such as VAZ [Motor Vehicle Plant] imeni 50th Anniversary of the USSR, the Leningrad "Burevestnik" Scientific Research Association, ZIL [Moscow Motor Vehicle Plant imeni L. A. Likhachev], "Kirovskiy zavod" and the "Uralmash" Production Associations etc. The production technology of metal-flouroplastic tape and the bearings made from it is used at dozens of enterprises

with large economic effects. There are bases for the wider use of composite materials in machine building. The institute took upon itself the role of a leading organization in introducing composites in machine design in order to reduce their use of metal, increase their service life and reliability. A large program of work was outlined for this purpose with a number of organizations.

Cooperation with industry made it possible to obtain data on the stressed state of complex designs at various operating modes, including extreme conditions in order to provide for the strength, reliability and long service life of the designs. The introduction into production of new antifriction materials, created in the institute, increased the service life of friction units by several times.

Further development of scientific work in the IMASh AN SSSR will create bases for designing the machines of the future, raise the productivity of labor, save metal and fuel, meet ecological requirements in equipment, and increase the the reliability, service life and competitiveness of new machines and assemblies.

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USE OF ROBOTICS IN SOVIET INDUSTRY

Robotics at Kirov Plant

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 7, Jul 82 (signed to press 21 Jun 82) pp 49-50

/Article by N. Kostikov, general director of the MPO of the S. M. Kirov Broaching and Punching Machine Plant: "The Candle is More Expensive Than the Game"/

/Text/ If specialists are cautious in their use of technical innovations--especially those which smash our notions of production automation--one must not be in a hurry to reproach them. If you act in ill-considered haste and pursue fads, you will not only, as the saying goes, make people laugh but will also discredit a good thing in their eyes. Take, for example, industrial robots which have been discussed many times before in the pages of this magazine.

At first we made two for loading lathes. The machine operators, naturally, were transferred to another sector. However, a robot, like any mechanism, has problems at times and must be repaired, adjusted, and serviced. In short, repairmen are needed instead of lathe operators. It turned out that it was not advantageous to robotize two machines--the candle, it seems, is more expensive than the game. A complex of machine tools must be equipped with manipulators. Isn't it generally wise to attach one robot, but an agile one, to all of the machines. The designers have estimated that one can make such a robot on a rail.

Or take the Universal-5 floor-type industrial robot. The experience of using it at our plant convinces us that it does not pay to keep such a "worker" in small series production. It is sluggish, slow, also bulky, takes up a large amount of production space, and requires special operating conditions to comply with safety practices.

Somebody, picturing this lifeless giant, will say sceptically: "we know these robots..." And it will be difficult to change his mind. But his mind must be changed. Are modern robots effective? There is no doubt that they are. Does the plant need them today? Of course! Is it maybe complicated to make such a robot? Yes, it is not simple, but the plant workers and our SKB/special design bureau/ designers have already proven that such a task is within their power. The starting point must be not "give us a robot" but rather "give us an economic justification."

Of course, it is difficult to manage such a complex business without costs. It is also unlikely that one can manage without mistakes. But then we have a firm knowledge of how to solve the problem. Industrial robots, auxiliary mechanisms, and the basic industrial equipment handled by them must operate as a unified, coordinated, automated complex or, in other words, an RTK/robotized industrial production unit/ This is not a mechanical union of local automation facilities. The observance of strict methodological principles and a whole series of system work-ups are required here.

A long-range plan for the introduction of RTK's in the 11th Five-Year Plan has been developed at our plan. Technical proposals for RTK's based on the 16K20F3, 1734F3, and RT705F312 machines with ChPU/digital programming control/ have already appeared in accordance with this plan. They are continuing to introduce an RTK-203G complex based on a 16K20F3 lathe. The Universal-5 has also not been forgotten. It will be adapted for machining shaft-type parts.

Five model KSh-63S balanced manual manipulators with a carrying capacity of 63 kilograms are being introduced into the machine shops. In cooperation with the Minsk affiliate of the NPO Orgstankinprom/Production Association of the State Planning, Technological and Experimental Institute for the Organization of the Machine Tool and Tool Industry/, four RTK's using programmed machine tools and an industrial robot made in Novosibirsk are being manufactured.

It is natural that robotization encompasses not only production shops but also the production of an association. We, for example, were one of the first in the industry to begin equipping our machine tools with automatic manipulators. We did not do this to follow a fad. The SKB designers were given the freedom to create equipment with maximum productivity, not limited by either the physiological qualities of a person or the limits of the plant's industrial resources. Well, what came of it? These machine tools turned out to be so productive that even the young experienced workers were not able to keep up with them.

When we are faced with the choice: to replace a worker on a monotonous operation with an automatic manipulator or not--there is still plenty of time in such a case. When you simply cannot do without a robot as, for example, when managing a complex of broaching machines manufactured for KamAZ/Kama Motor Vehicle Plant/ for machining a connecting rod group--this is another matter. The productivity of these machine tools is 400 parts an hour.

The first models of vertical broaching machines with ChPU, which have now been tested, have also been equipped with manipulators and multi-tool magazines. In addition to these, a wide mix of automatic machine tools for mass production, operating on automatic lines, is being tested. Within a comparatively short amount of time, almost 70 percent of our machine tools will be equipped with automatic manipulators.

Clearly, the robotization of production is not a panacea for all ills. Just as the introduction of even one manipulator requires its careful coordination with adjacent industrial units, so also the robotization of production as a whole is successful only when it becomes an organic, constituent, and unified program of technical re-equipment.

Robotics at a Feed Machinery Plant

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 7, Jul 82 (signed to press 21 Jun 82) pp 50-51

/Article by R. Vecher, director of the Gomel' KTEI for the technical re-equipping and preparation of production of the enterprises of VPO Soyuzkormmash, and V. Kharlanov, department chief: "An Engineering Approach is Required"/

/Text/ The creation and introduction of automatic manipulators and RTK's/robotized industrial production units/ is far from a simple task. Let us say, production workers doubt the economic advisability of their introduction in individual operations. We emphasize the phrase "in individual operations" since now the tendency to use robotics is gathering force. The economic impact is really insignificant here and at times altogether negative. Robotized sectors, shops, and even enterprises must be created. Many institutes and design bureaus are already working on them.

Today, using the developments available in the country, industrial enterprises must more persistently introduce robots on difficult and harmful operations, where not so much an economic as a social impact is more quickly achieved. Such a direction, in particular, was chosen at the PO Gomsel'mash/production association of the Gomel' Agricultural Machine Building Plant/. They are using robots here primarily to load and unload machine tools when machining large shaft-type parts, reduction-gear housings, as well as in coloring and cold-stamping production.

Our institute is developing RTK's and sectors for the industrial processes of machine working, cold stamping, and assembling. These units are based on the domestic robots SM40Ts4011, Universal 15.01, Rhythm 05.01, KSh-63, and also the Bulgarian Pirin-type robots. It must be noted that it is not difficult to select the necessary robot, but acquiring one is an entirely different matter. And it is a problem if no one is busy with the centralized manufacture of robots for the machine building industries. Things are even worse with the RTK technical equipment--the storage, feeder, orienting devices, etc. There are no catalogs and informational literature on them. Nothing has been said about the series manufacture of equipment. At times these devices are not inferior, in complexity, to robots and not every enterprise is capable of manufacturing them. Taking this into account, our specialists have created unified feeders for the RTK for cold stamping and machining. For example, two sizes of lifting feeders with d.c. electric wiring which permit the regulation of the speed of feeding the blanks under the grasp of the "arm" of the robot have been developed for the stamping operation. The first size feeder permits working with parts up to 250 x 250 mm, and the second with parts up to 500 x 450 mm. The height of the magazines in both cases is 350 mm (their capacity depends on the thickness of the parts).

A feeder of revolver-type slabs with eight magazines for loading parts has been developed and manufactured. When the first magazine empties, the next one and so on is automatically fed under the "arm" of the robot. The height of the magazines is up to 600 mm, and the part sizes reach 170 x 90 mm.

Two types of feeders developed by the institute are used in the RTK to machine shaft-type parts: one for shafts with a diameter up to 80 mm and a length up to 600 mm and the other for shafts with a diameter up to 180 mm and a length of 1100 mm. Moreover the unloading from the package is automated, the part output device is highly accurate in its orientation to the robot. The capacity of the package is 60 or more parts which provides the RTK with continuous work for 2-3 hours without changing the package on the feeder.

Using feeders and SM40Ts4011 robots, the institute developed shaft-type part machining lines for the PO Gomsel'mash and the plant Orlovsksel'mash/Orlovsk Agricultural Machine Building Plant/. The EM-300 hydrocopying machine, the MR-73M milling-centering semiautomatic machine, the 5B63G thread-milling semiautomatic machine, and others are used, with appropriate modifications, on these lines. A shaft-machining line which has nine machining tools and four modular-type robots developed by the institute is also of great interest to the machine building plants. Four modifications of a robot, which allow the loading and unloading of various machine tools with parts weighing up to 40 kilograms, are being assembled from six modules differing in design and purpose. There is yet another robot, the RPS-1, which is operated in the cold-stamping production of the PO Gomsel'mash. A robotized stamping sector on presses up to 160 ton-force, using four such robots, is being planned.

If the design of the RTK and the industrial equipment facilities do not cause special difficulties, then the manufacture of prototypes will grow at times into an insoluble problem because of the lack of a number of supplied d.c. motors, electric clutches, pneumohydroautomatics, etc. The supply organs must act more carefully toward the orders of specialized organizations dealing with the creation of robotic equipment.

It is also necessary to re-direct the psychology of the designer planning the new machine. He must unitize it to the maximum extent, providing for such an arrangement of individual units and total design, that one could entrust the robots with part manufacture and assembly.

Togliatti Plant Engineer Interviewed

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 7, Jul 82 (signed to press 21 Jun 82) pp 52-57

/Interview with N. I. Ivashchenko, engineer of generator and starter production at the Togliatti Automotive Plant, by correspondent V. Ponomarev: "Robot Plus Robot"; date and place not given/

/Text/ The main wing of the VAZ/Volga Motor Vehicle Plant in Togliatti/, stretching for several kilometers, resembles the letter "Sh" only with ten rather than three cross-pieces. These are called "inserts" at the plant. Near each of them are VAZ entrances and here there are bus stops where vehicles come, in a continuous flow, during changes of shift. Cutting into the main building, these inserts also serve as transport arteries along which assemblies, units, and completed articles come to three threads of an assembling conveyor.

Here and there the harmonious interchange of inserts has already been disturbed--new shops occupy the space between them. However, besides understandable satisfaction (not a planned capacity of 660,000 vehicles, nor the 725,000 which were produced in 1980--there is no ceiling for the plant, even more Zhiguli's will be manufactured) this construction landscape on plant territory has also raised questions. So much has been said about the faultless quality of the plan, about the balance of all production where the most insignificant disruption of industrial rhythm is intolerable (99 percent of the plan--this is no good at all, but 101 percent is not any better) and suddenly--an expansion. How much has been said about these building additions which are not always beneficial. For, constructed contrary to the plan, they adhere to the plant organism like mollusks on the bottom of a ship and, at times, deprive the most perfect ship of its seafaring qualities.

It has turned out that the new construction and the broadening of plant capacities do not threaten any reductions. All of this was envisioned even at the VAZ design stage. Hence the lay-out was in the form of the letter "Sh", selected with the calculation that some day one could build in the space between the cross-pieces, at a large savings, a communications building with the most effective utilization of plant territory.

Such an approach, which takes into account the long-term view, is characteristic not only of the VAZ. The PGS/generator and starter production/--a part of VAZ--was built considerably later than the head plant (the first production was issued only in 1974-75). However, now after three years, the PGS has started producing industrial robots! It is a known fact that even for the modernization of series production, we are not talking now about the output of fundamentally new products, the average plant requires several years. Here is produced not a starter, not a generator, but a robot with its electronic, hydraulic, and mechanical stuffing.

Our meeting today is with Nikolay Ivanovich Ivashchenko, the PGS engineer.

Correspondent: Nikolay Ivanovich, I want to ask several questions right away. First, what relationship do robots have to the production of starters and generators? Secondly, how do you explain so operational a re-orientation of your production on such complex items? Finally, what is your basic production?

N. Ivashchenko: First let me give an example. Please forgive me if I reproach some Belorussian enterprises. VAZ needed a unique electronically-controlled automatic line for machining the block of the VAZ-2105 vehicle engine. We turned to the Baranovichi and Minsk automatic line plants. There they started to manufacture such a line with a relay control system. One can understand what guided them in Minsk and Baranovichi: they have a settled production line, series output and, moreover, a plan... A line with a relay system would cost the least amount of money. However, such a system belongs to machine building of the past. What else could the VAZ people do?

We had to take over the manufacture of the line. You can already see it in operation in the set-up mode. We manufactured not only the mechanical and hydraulic parts but also all of the electronics.

I realize that this example did not answer your questions, but I confused things even more instead. Yes, our production was expected to be starters and generators. However, even during the design, construction, and purchase-of-equipment stages, it was envisioned that the PGS also had the responsibility of providing VAZ with the most progressive equipment. To be more exact, it was responsible for only a part of these things. Something is bought abroad, something is produced at specialized enterprises of our country but, as you know, at times it is difficult to find a manufacturer. Besides, the PGS was busy producing the most complex equipment, specifically, the KVTs/auxiliary shop complex/ of VAZ, where they designed and manufactured an automated welding conductor for the Niva motor vehicle with a capacity of 75,000 auto bodies a year.

Of course, every enterprise manufactures some equipment for its own needs. We produce not only equipment and individual machine tools but also automatic lines, even whole industrial complexes. Thus, manipulators, as you see, are not the most complex item of our production.

Our main production is starters and generators, without which VAZ cannot manage. They are produced by the millions, then the line counts go to units of manipulators--hundreds of them a year.

Correspondent: Is this a lot or a few?

N. Ivashchenko: As the saying goes, it depends what side you are on. If you compare it with the needs of the domestic motor vehicle industry, then 500 of our manipulators, of course, do not satisfy requirements. If you are talking about absolute numbers, then the PGS produces more robots than anywhere else in the country.

Correspondent: Incidentally, I saw MP-9S manipulators at work on the sector manufacturing synchronizer rings. There were West Germans working there next to yours. In my view, your robots are not one bit inferior to the foreigners, rather the other way around...

N. Ivashchenko: Dozens of plants, NII's/scientific research institutes/, and KB's/design bureaus/ are developing, with varying success, robots that are narrowly-specialized and attached to a specific part and a specific industrial process. We offer to the consumer a finished mechanical worker that is easily adaptable under any conditions. This worker is not only efficient but also exceptionally dependable: its design has been repeatedly tested and the manufacturing technology has been worked out in detail.

I will also answer your first question on the re-orientation of production to manufacture manipulators. Of course, an unformed design collective must not master such production. For example, we created our robot in cooperation with specialists of the Leningrad Technical Institute. The powerful scientific potential of one of the largest VUZ's in the country and advanced technology--such is the background of our first-born.

The powers of our designers have grown stronger in joint work. In addition, this long-term topic has attracted many experienced specialists from the leading VUZ's and academic centers of the country. A majority of them have settled down with families, obtained apartments, and consider themselves native Togliatti people.

The MP-9S already has three VDNKh USSR medals and is now being readied for the Leipzig Fair. By its indicators it is on the level of the world's best models.

Correspondent: I attended the all-union exhibition "Industrial Robots--Automatic Manipulators." There were all kinds of robots there: many-handed, of impressive sizes, manipulating at times dozens of kilograms. I would not like to offend your offspring but, next to them, the MP-9S would certainly look modest. Its hoisting capacity is only a quarter of a kilogram and the length of its only hand does not exceed a meter...

N. Ivashchenko: You erroneously consider the cited data to be deficiencies. Let's try to look into this.

As I already said, a majority of the robots which you saw were designed for one industrial process. Put one of them on another machine tool or give it another part and it does not know what to do. A plant needs some, one or two, of these manipulators.

And what is a quarter of a kilogram? It is radio components and candy; glass, metal, and ceramic ware; parts of the largest bearings; packed chemical agents (often dangerous to an individual's health); and medical compounds, bulbs, photographic goods, children's toys. In short, the most popular goods fit into a 250-gram limit.

Now let's look at the most typical manipulations of a worker with similar items. He took a blank from the storing device, turned 90 degrees and placed it under the press, then took the finished part, turned again at a certain angle and placed it in another storage device. Do you have to work on such an operation? Thousands and thousands of workers are engaged in this wearisome and, frankly speaking, boring work.

We have become accustomed to calling mass professions popular. Indeed the manipulations of fitter-repairers are non-repetitive, as dissimilar as the afflictions of two machine tools or motor vehicles. The profession of fitter is also attractive because of this non-repetitiveness which is why it is popular. Assembly line work is uniform everywhere and that is why it is uninteresting. What kind of popularity is that! However, assembly work--the most popular process in numbers--is the main area where we can free workers' hands.

Correspondent: Incidentally, doesn't the formulation "freeing workers' hands" seem strange to you? Primitive work chains not only a person's hands but also his brain. By replacing a person with an automatic machine, we thereby free his thought and intellect for creative work.

N. Ivashchenko: I agree. However, you will also agree that the MP-9S, by carrying out the simplest operations, serves just this purpose. To tell the truth, I reluctantly use the word "robot" in this connection. A robot is nevertheless a concept of a higher order. The MP-9S is an automatic manipulator. This is more modest and closer to the truth. However, this does not decrease my respect for it in the least--at any average plant it easily replaces 200-300 workers. Naturally, we are not talking about a single model. The number of them needed must be

decided on the spot. To do this you need dozens of smart engineers who would conduct an appropriate investigation of the enterprise and develop a requirement for robots. The MP-9S is produced with a full set of necessary attributes: sensors, drives, storages, control and air cleaning systems. In short, it has everything that makes its use possible for a plant of any type, in any industrial process.

All together we have already manufactured many hundreds of manipulators for Latvia and Novosibirsk, Estonia and Togliatti.

Correspondent: Maybe I am mistaken, but I did not see them at one of the Minsk plants I had to visit. What is more, I had not even heard mention of your robot before my trip to Togliatti.

N. Ivashchenko: I will add. You are the first person from Belorussia who is interested in the MP-9S automatic manipulator. I have the impression that in your republic they still do not suspect its existence. The same thing applies to the Ukraine. I say this with the greatest annoyance since I know how the Ukrainian and Belorussian industries fancy themselves. Representatives of the Baltic area and Siberia, the Transcaucasus and Moldavia are literally beseiging us, demanding ever newer and newer robots. Why are the Belorussians and Ukrainians silent--this remains a mystery to me. This matter possibly is due to a lack of information, although...we do not live on different planets.

Correspondent: Let us assume, however, that one of the Minsk plants is interested in your product. How can it be obtained?

N. Ivashchenko: At the present time the manipulators are not stockpiled and are not shipped according to a general allocation schedule, and we ourselves handle their distribution. There is one way out: contact us and wait in line. Our specialists always meet initiative and engineering boldness halfway.

Correspondent: Last year the editorial board of our magazine conducted a round table on the problems of robotization, in which the leading specialists of the republic participated. I heard this story there--several years ago some carefully packaged freight arrived at one of the Minsk plants from Togliatti. The parcel was opened and a robot was discovered. It turned out that no one had ordered it. I must confess that up till now this story seemed unlikely to me.

N. Ivashchenko: Nevertheless, it is the truth. In 1979 we manufactured a test batch of robots--40 items--which we sent to various addresses. This was not done randomly, of course. We selected large, modern enterprises where, in our view, the use of manipulators could have a great impact. Each plant received one. It was not at all the case that we had difficulties with sales, but on the contrary--each, as the saying goes, was dug out with our own hands. However, for the sake of the experiment there had to be a sacrifice by the engineers, already experienced in the robotic equipment of customers, who had to send manipulators to new addresses.

But this was not a foisting off of robots. This was, if you wish, a foisting off of an idea, an exploring of unprepared soil.

Correspondent: Is it not wise to first of all prepare the soil?

N. Ivashchenko: Imagine that builders have to dig out a foundation with a volume of several million cubes. A foreman comes to the project and starts to consider what is necessary for it: a thousand two-horse carts, about five thousand wheelbarrows, and ten thousand workers with picks and shovels. Wouldn't you say this is absurd? Yes, we operated with similar "categories" several decades ago. The modern builder chooses only the most efficient means: a BelAZ/a vehicle made by the Belorussian Motor Vehicle Plant/, a MAZ/a vehicle from the Minsk Motor Vehicle Plant/, or KamAZ/a vehicle from the Kama Motor Vehicle Plant/, a rotary bucket or bucket excavator.

The situation is also different now in the industry. There where they count as usual only on the employment bureau, they actually continue to think in yesterday's categories. At those industries where the situation is assessed correctly, our gift was accepted with gratitude. They quickly found a use for it and soon after requested not one, but several robots.

Keep in mind that it is practically impossible to obtain a robot, both before and now. Here and there a NII and KB, by arranging a strong experimental production, creates one or two robots. That is all. Plant designers do not have enough theoretical training. That is why a finished robot--even one presented nicely on a saucer, remains a dream. Incidentally, what did they do with our envoy in Monsk?

Correspondent: I was informed at the plant automation department that the robot was sent back.

N. Ivashchenko: Why, one can only be sorry. I hope you understand that I am not an advocate of spreading robots forcefully. On the contrary, robotization is a new and extraordinarily complex business requiring careful organizational and even psychological training and technological coordination. However, in the first place, the MP-9S is versatile and armed with everything that is necessary, and its introduction does not require a complex technical reorganization. Secondly, we are only talking about one model and it is strange that the plant decided not even to inspect it in operation. In short, they did not even accept the concept in Minsk and this is already a disturbing symptom.

Correspondent: Maybe everything is simpler. The first question in discussing any innovation is "is it profitable?" The second question is "if it is profitable, then when will its impact be felt?" The MP-9S costs 6,000 rubles. A simple calculation shows that even when replacing the most qualified worker, its impact can only be calculated slowly. One must assume that they calculated in just this way at the plant.

N. Ivashchenko: This is absolutely wrong. Isn't it really absurd to calculate the economic effectiveness of the plant clinic, the children's services, the dispensary, the order store, and the system of services. A plant has all of these and there are no personnel problems. In such cases we speak about the social impact, which is not measured in rubles. The business with robotic technology is even more complex since it revolves around a double impact--social and economic. The mass use of manipulators, on the one hand, will sharply increase labor effectiveness

and, on the other hand, will raise safety and remove from the administration a part of its worries about housing, children's institutions, and medical service since the line for housing, the children's nursery, and in the doctor's office will move more quickly. If you consider all of this, 6,000 rubles will not seem to be so great a sum now.

Of course, it is necessary to consider not only how we have done things up till now. Unfortunately, there is no more ideal method for the present. It is necessary, in our view, to develop it at least at the Goskomtrud/State Committee of the USSR Council of Ministers on Questions of Labor and Wages/ level. The experience of a great number of enterprises has proven that even if there is no economic impact at first, the plant, in the final analysis, seems to be the winner.

Correspondent: How are things going at those places that have accepted both the concept and the robot?

N. Ivashchenko: Latvia can serve as an example. In this republic things were centralized at the Gosplan level and all enterprises which could become our potential customers were investigated. Gosplan appealed to us, requesting no more or no less than 200 sets. A very small amount of time has passed and we are already receiving new requirements from Latvia. I am sure that no matter how many robots we would send them, it would not be enough. The idea has taken firm roots, each manipulator becomes an excellent "publicity agent." The need for them will progressively grow.

Manipulators have taken root very well at the Leningrad plants, the leader among them being LOMO/Leningrad Machine Optics Association/. There are already many mechanical workers there and they are asking for even more. Leningrad is asking for 100-150 manipulators and Kazan is requesting 100. All together, our robots work in 80 cities of the country. But in Minsk, as we have already said, there is not one.

As a successful option for organizing work, one can cite that same VAZ. A centralized department with qualified technicians and designers who are totally busy with production robotization was created at the plant. Naturally, they are not limited only to our manipulators here. The plant informational service keeps them abreast of all innovations in robotics. The robot is just being developed (whether in Togliatti or Leningrad), but they are already seeking a place for it at VAZ and making draft studies.

Of course, not everything is going smoothly with us. The engineering work force, unfortunately, is not sufficient. We have tried to find a firm which would analyze in detail AvtoVAZ/Volga Motor Vehicle Plant Production Association/ and put together a long-term robotization program. We did not find such an organization in the entire country. Therefore the department is only a partial solution to the problem. The time has come to create a single robotization center in the country. Scientific research and design personnel, and an advice and information as well as a publicity service must be concentrated here. Logically, such a center could operate under Minavtoprom/Ministry of the Automotive Industry/. Only then will one be able to buy robots as we buy machine tools today, repair them operationally, and operate them competently.

The first step has been taken in Novosibirsk. There 70 of our robots lie, as the saying goes, on a counter. One can see them in operation, obtain necessary explanations, buy and put them to work with the help of qualified specialists. However, we are only talking here about sales. In the robot production area we, unfortunately, are repeating already well-known mistakes. Now at any plant they know who is responsible for the hydraulic equipment, for the mechanization and automation facilities, and for electronics. But there is nowhere to turn for the robot (or with the robot if it "became ill"). Many organizations, not having sufficient resources at their disposal, squeeze out semi-primitive robots which it is difficult to call by such names. They often needlessly duplicate each other.

Correspondent: We have already mentioned the all-union exhibition of industrial robots which opened at the USSR VDNKh. Would you, using the publicity prospectus, comment on some of its exhibits?

N. Ivashchenko: The exhibition is interesting. Dozens of robots, from true jeweler size to giants that control very heavy metal blocks, are attracting the attention both of specialists and of laymen. On one hand, the exhibition points out how unlimited are the reserves for using manipulators in the most diverse industries; on the other hand, it demonstrates the enormous potential of our industry. However, the surprising similarity of some exhibits catches one's attention.

Take, for example, the "Brig" and the "Universal-15." They have the very same functions, differing from one another only in their computed grams of carrying capacity, while their other basic parameters are similar. I do not want to reproach any of the creators for technical plagiarism but, on the contrary, I believe that each was "stewed in its own juice." The fact is that they arrived at the same result quite legitimately. There were two similar industrial processes, two similar tasks were set, and well-known principles were used in the design. And so the twins were born, only one in the Urals and the other in Moscow. Wasn't this really wasteful since only half of the effort needed to be expended?

Or take the MP-101 from Vladimir and the KSh-160 from Volgograd. They are also absolutely identical manipulators. The reason is the same--the lack of coordination. There is also a double of ours at the exhibit. We ask the creators:

"Wouldn't it have been wiser to take one that was already finished?"

"No," they answer, "ours has a 50-gram carrying capacity."

Of course, if you go to VDNKh you stand a good chance of receiving a prestigious award. The legitimate pride of the designers who built the manipulator is understandable to me as an engineer. But let's assess the exhibits from the viewpoint of state interests. The robot MP-101 plus the robot KSh-160, how many will that make? Two?

Unfortunately, no. The "Brig" plus the "Universal-15"? Here too the sum is only one robot. One could continue with examples. By duplicating robots we only lose resources and time and expend a great amount of engineering and design potential to no avail.

I repeat, a coordinating center is necessary. By turning there, the specialists of such and such a KB will learn that a manipulator which they need has already been created and is on sale, let us say, in Togliatti. The center can suggest that they develop a different one which has not yet been produced in the country.

Correspondent: According to the information of the magazine US AUTOMOTIVE INDUSTRY their own robots are being developed by many motor vehicle firms which are successfully competing with specialized firms. Doesn't this contradict your words?

N. Ivashchenko: In creating robots, we will inevitably go along the similar paths of foreign engineers--the basic design ideas and technological resources are similar in Sweden, Japan, and the USSR. However, in drawing an analogy, let us not forget the differences, the main advantage which the socialist way of running an economy gives us. They have competition, we have cooperation and the socialist division of labor; they have "trade secrets", and we have mutual aid and the exchange of information. Maximum utilization of these advantages would sharply speed up the robotization of our industry.

Correspondent: Several months ago Moscow radio transmitted this report: a group of American scientists protested to the president against the curtailment of scientific contacts with our country. In maintaining that the president was overestimating the resources of American science, they argued that in the area of robotization, in particular, the Soviet scientists had gone ahead...

N. Ivashchenko: Since they were talking about science, they apparently had theoretical work in mind. I can compare only what I see in plant shops. Yes, the MP-9S and many other Soviet robots are in no way inferior to their foreign brothers. However, all of these are single robots, but the time has come to think seriously about RTK's/robotized industrial production units/. They already exist; several are also being demonstrated at the exhibition. Nevertheless in this area we must fight for a priority for the more complex things. So, judge for yourself. On the Japanese line for baking motor vehicle bodies there are 22 (!) robots which, independently and without a person's help, distribute the finished body. Two adjusters and two operators attend the complex.

The future for RTK's is even more powerful. Suitable projects are already in the designer's portfolio. Let's decide to forget the notion "robot". Think only of RTK!

Correspondent: What about the MP-9S? I must confess that during our conversation I was filled with sympathy for it and many times was sorry that it did not have a more melodious name. In my opinion, it has fully deserved it. I have seen how it operates a powerful press stamping out synchronizer rings. You know yourself how it clicks and whistles. It even gives the impression that it gains satisfaction from work. You cannot say this about the people working next to it. Their legs swell up, their backs get tired from lengthy periods of sitting motionless, and their hands become numb.

N. Ivashchenko: The entire ring synchronizer sector is on the point of being robotized. Therefore the stampers can already try to find more attractive work for themselves, and the plant will help them do this. As you can see, the responsibilities of our robots are not decreasing and, therefore, we will produce more of them. Why be concerned about a more poetic name? Think for a while about this.

Correspondent: We wish you success.

MACHINE TOOL BUILDING IN BELORUSSIAN SSR

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/Article by N. Kovalenko, scientific associate of BelNIIPU of Gosplan BSSR: "Accuracy and Reliability"/

> /Text/ Our republic is in third place in the country in volume of machine tool production. Its share is 13.7 percent of the metal-cutting machine tools and 5.2 percent of the automatic lines. The Belorussian machine tool builders manufacture 47.5 percent of their total production with the state emblem of quality--almost 10 times more than in 1972.

It is noteworthy that the machine tools produced by our republic are basically at the level of foreign models and even exceed them in individual indicators. Thus, the 8V 220 and 8V 262 abrasion-cutting automatic machines from the Gomel Machine Tool Building Plant imeni S. M. Kirov exceed similar models from foreign firms in such technical indicators as the size of the cut material and the cutting speed.

However, it should be noted that the machine tool builders of the republic have far from exhausted the available reserves for increasing the quality of their production. It is necessary, in particular, to introduce on a wider scale highly efficient and precision equipment, including machine tools with ChPU/digital programming control/, totally mechanized production lines for machining parts, to carry out the further mechanization and automation of assembling, regulating, and adjusting operations, to continually look after outfitting enterprises with highly efficient equipment and mechanized warehouse equipment.

At present the machine tool building enterprises are using such indicators as the volume and percentage of production of the higher quality category, the production realization volume and the quantity of articles manufactured with the state emblem of quality, etc. There are also indicators for the reliability and durability of metal-cutting machine tools, and labor quality.

Of course, each of them is selected depending on the special features of the machine tool design and the operating conditions. The planning of these indicators has important significance, At the same time the service time period until the first capital repair and the guarantee period (the latter is essentially a guarantee against defects in material for which the manufacturing plant is to blame), as a rule, predominate in a majority of cases in planning quality indicators.

Only the sum total of such indicators as productivity, accuracy (service life accuracy), reliability (mean cycles between failures), and specific metal-content will allow the achievement of a higher level of quality of metal-cutting equipment. Taken separately, they do not give a full appreciation of the user properties of a machine tool.

It is not out of place to include service life accuracy in the quality indicators of metal-cutting machine tools. The operation of these machine tools at their prescribed accuracy within the limits of the first average repair permits a decrease in the cost for restoring accuracy standards, an improvement in the PPR /scheduled preventive maintenance/ system, and an increase in labor productivity. However, the machine tool building enterprises, in order to preserve the accuracy parameters of metal-cutting machine tools, only stiffen accuracy standards within the limits of 30-40 percent in relationship to those accepted for GOST/all-union state standard/ or TU/technical specifications/. In other words, the value characterizing some parameter is indicated in GOST and TU. By way of example, the rectilinearity of shifting a table in a lengthwise direction for the universal tool-grinding machine tool 3V 642 of the Vitebsk Tool-Grinding Machine Tool Plant imeni 22nd s"ezda KPSS is 0.01 mm. They stiffen this value by 40 percent, but in delivery norms the value is reflected as 0.006 mm. The difference, amounting to 0.004 mm, is the reserve of accuracy which is regulated for the model in question. The plant manufacturer does not indicate the operational time period for maintaining accuracy in the standard technical documentation. As a result, neither the manufacturer nor the customer bears responsibility for maintaining accuracy.

Of course, the operating conditions are different. Sometimes the equipment is used more intensively and sometimes not in line with its purpose. Thus, the accuracy parameters also change. So, in the second case the machine tool accuracy parameters are reduced significantly and more quickly than during its intensive utilization. However, the equipment customer, by indicating the operating conditions, helps the manufacturer to consider in his development work the special features of a given design when providing both the required productivity and the reliability. Consequently, the customer sort of guarantees the operating conditions of a given type of equipment.

What kinds of guarantees does the manufacturer set? In the first place, the basic machine tool model has already been worked out for reliability and durability and the specific operating conditions have been taken into account. Secondly, the standardized, normalized centers which inspect for reliability are being used all the more. Thirdly, the manufacturers have sufficiently high technical potential which, naturally, assists in the production of machine tools with improved accuracy parameters. Thus, it is now advisable and necessary to establish accuracy parameter maintenance time periods for metal-cutting machine tools not for one year but for a lengthier period, let us say, until the first average repair.

Mean cycles between failures serves as the basic quantitative indicator when planning the reliability of metal-cutting equipment. One can determine this indicator as the ratio of the sums of the time intervals of faultless operation to the number of failures during a set time interval. The importance of this indicator is that it permits the establishment of a between-repairs period, i.e., the planning of repair work to include the equipment loading rate. Additionally, it becomes possible to predict failures, which is especially important for metal-cutting equipment. Therefore, the planning of such an indicator will help in increasing the quality of complex equipment systems.

The specific metal-content indicator (Q_m) for metal-cutting machine tools is the ratio of the volume of finished output (M) to its basic parameter (B):

$$Q_t = M/B$$

One of the indicators (main power drive, table width, etc.) can be taken for the basic parameter. An analysis of the weight characteristics of domestic metal-cutting machine tools shows that in absolute weight they are inferior to their counterparts in the leading capitalist countries. According to data of NILTN [not further identified] of Minstankoprom [Ministry of the Machine Tool and Tool Building Industry], the average weight of a metal-cutting machine tool produced in our country in 1980 was 3.63 tons. In 1975 in the United States it was approximately 1.2 tons.

Practically all groups of metal-cutting equipment produced in our country tend to increase in average weight. For example, the average weight of a metal-cutting machine tool has increased from 1970 to 1980 as follows: broaching machines by 48.4 percent, boring machines by 40.2, gear-processing by 9.2, and grinding by 11.7 percent.

The main power drive of domestic metal-cutting machine tools is also growing. As a rule, it is 1.5-2 times higher than in foreign models.

Or take the specific metal-content of metal-cutting machine tools. The size of the main power drive plays an important role during its calculation. First of all, the specific metal-content is lowered when increasing the latter. That is why the designer travels the path of least resistance: the main power drive increases although it is not fully used in operation. At the same time it departs from engineering calculations in firmness of a number of parts and units. At present, for example, only about 20-30 percent of the basic parts limiting the reliability of machines and equipment are assessed for firmness. The remaining parts fall out of the field of vision of the designers.

Metal content also depends mainly on the manufacturing technology. The number of cast parts can be decreased by using high-tensile, low-alloy steels, precision casting, etc. On the average, cast parts now make up about 80 percent of the total weight of metal-cutting machine tools. As you can see, there is a large reserve for lowering the weight of machines and equipment by using modern machining methods.

In order to lower the specific metal-content of machine tools, it is necessary to limit the growth of the main power drive and establish, before the start of planning, gradual maximum machine tool weight by considering the level of the best foreign models. This will permit a much wider utilization of standardization and unification and welded constructions, a more in-depth estimate of firmness, and an improvement in the design of the machine tool.

Certification also has important significance in planning for the improvement of production quality. The end result of certification is to increase the effectiveness of public production, to more fully satisfy the requirements of the national economy for high-quality output, and to compete more effectively on the world market. Recall that in our industry the state certification of production was introduced experimentally in 1967. Among the first to be awarded the state emblem of quality was the especially highly accurate model 3711 surface grinding machine

tool from the Orsha Krasnyy Borets plant. The system of certification was later improved and introduced into all sectors of the national economy. This has permitted systematic work on increasing the output of products with high technical and economic indicators.

An analysis shows that practically all enterprises (with the exception of the Baranovichi Automatic Line Plant and the Vitebsk Machine Tool Building Plant imeni 22nd s"yezda KPSS) are overfulfilling their established tasks. Thus, the 1980 plan for the output of production of the higher category of quality was fulfilled: the Vitebsk Plant imeni Komintern by 110.5 percent, the Minsk imeni S. M. Kirov by 109.8, the Orsha Krasnyy Borets by 103 percent. Now several enterprises (Vitebsk imeni S. M. Kirov, Gomel imeni S. M. Kirov, and the Minsk Plant imeni Oktyabr'skaya Revolyutsiya) are manufacturing 60-70 percent of their production volume with the state emblem of quality, i.e., practically the entire series production.

At the same time, some enterprises are not fulfilling the planned tasks, in real terms, for a number of models. Thus, in 1980 the Orsha Machine Tool Building Plant Krasnyy Borets produced 11 model 3E 711V surface grinding machine tools less than planned. There are enterprises which, in general, are not planning to manufacture specific machine tool models of the higher category of quality although they were actually certified. The explanation for this is that the planning of certification, in individual cases, is carried out formalistically.

Along with production quality indicators, they are also planning labor quality indicators. They include, as a rule, the increase in the share of production accepted by OTK/technical control department/ since the initial submission; the decrease in losses from defects; a drop in the number of complaints; the labor quality coefficient.

It is important to note that at the machine tool building enterprises the approach to the labor quality indicators has been differentiated by taking production into account. Specifically, at the Vitebsk Tool Grinding Machine Tool Plant imeni 22nd s"ezda KPSS, the following indicators are being established for the preparatory forging and machine shops: the growth in OTK acceptance of output since the initial submission, an increase in industrial discipline, a decrease in losses from defects per ruble of production cost, a drop in the number of assembly shop complaints. In turn, typical indicators for the assembly shop are a decrease in the number of customer complaints and claims for production and technological reasons, the size of the fine per ruble of production cost, the increase in industrial discipline, and the acceptance of output by the OTK since the initial submission.

At the same time the labor quality indicators presented above not infrequently fail to answer the actual situation. For example, a subjective approach is often tolerated in evaluating the acceptance of output by the OTK since the initial submission. Therefore, evaluation indicators and the conditions for accepting output must be made tougher. It is clear that, as a result of this, the volume of OTK acceptance of production since the initial submission will be somewhat reduced. However, this is a temporary phenomenon. It does not fully reflect the labor quality of the manufacturers and the indicator for lowering the number of complaints since the customer does not always complain to the supplier when defects are discovered in the operation of a machine tool.

The organization of production planning is of great importance in improving the quality of output. However, it should be noted that at machine tool building plants the stage (phase) for planning quality is not being observed at present. One can often encounter the interlacing of separate stages which does not sufficiently allow the exposure of typical features peculiar to them. Questions on forecasting the technical level and quality of metal-cutting machine tools have not been properly solved. The lack of a forecast for 10-15 and more years makes it impossible to consider the trends in technological development and, even more, the changes in the age and technological structure and the time periods for renovating the equipment operated in the forecasted period.

The economic foundation for the expected results is often lacking in the sections of the five-year plan. Often instead of specific quantitative values, general formulations of the kind "improving quality", "increasing accuracy and reliability", etc. are figured which leads, as a rule, to the introduction of measures which have little impact. In accordance with the decree of the CPSU Central Committee and the USSR Council of Ministers "Improving the Planning and Strengthening the Economic Mechanism for Increasing the Effectiveness of Production and the Quality of Work", questions on increasing quality require a total programmed approach. Such an approach assumes the total utilization of resources and the interlinking of various plans for achieving the set goal. Therefore the total programmed planning of quality must be based on the development of specific overall programs. Moreover, the recommended structure of the program for increasing the technological level and quality of machine tools must include the following sections: an analysis of the state of the problem, the formulation of the main goal, a structural part, resource development, and organizational control.

The initial stage in program development--a thorough analysis of the problem--is a search for ways to solve it in the retrospective period and the discovery of limitations affecting the realization of the given goal and a determination of the degree of satisfaction of national economic requirements for producible types of equipment. Moreover, it is important to make their customers known, to consider their needs and requirements in order to put the optimum technical and economic indicators of quality in the design.

The main goal--the satisfaction of customer needs for equipment with high technical and economic indicators--is being formulated at the second stage based on an analysis of the starting level quality of metal-cutting equipment. The structural part of the program is developed at the third stage. Here are indicated the stages of work in an enlarged form, the time periods for their fulfillment, and a staff of workers is named. The resource development of the program is conducted at the fourth stage: the sum total of resources, including material, labor, financial and informational, are considered. The resource requirement is determined by a method of direct accounting for each measure both in real and in cost terms. The management of program control resides in the final stage.

The use of programming methods does not require a special re-orientation because the existing organizational structure contains elements peculiar to specific programmed planning. The general administration of the quality program must be handled by the general director of the enterprise. It is advisable for the chief

engineer to carry out the functions of manager. A group of workers, 2-4 people, (depending on the complexity of the program) is subordinate to the manager.

The use in the national economy of machine tools meeting the modern level of production will help in speeding up the growth of labor productivity, in conserving metal, and in increasing the quality of output. This is especially important at the present stage of economic activity.

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